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## EXECUTIVE SUMMARY

Current value human resources accounting attributes value to an organization's human resources by forecasting anticipated changes in outcomes attributable to changes in organizational functioning and converting those back into the performance metric. The present study builds upon an earlier effort (which used data from civilian industry) and constructs an equation system for doing this for Navy units.

Two waves of Navy Human Resource Management Survey (NHRMS) data for 174 fleet units were merged with readiness (FORSTAT), unauthorized absence, desertion, non-judicial punishment, drug and marijuana offense, and reenlistment data for periods covering several years for those same units.

The findings indicated a remarkably strong ability of the NHRMS indicators to predict future unit outcomes. To complete the value attribution process, use was made of a change typology which had been formed earlier, here combined into "gainers" (units whose NHRM inter-wave changes reflected improvement) and "losers" (units whose NHRMS changes reflected deterioration.)

The forecasted results show that the gainers could be predicted to have had over 1600 persons over a two year period that would not have to be replaced because of non-reenlistment, unauthorized absence, or desertion. The losers, in contrast, would require that roughly 1150 persons be replaced. Extended to the fleet, these figures would

amount to over 17,000 and 12,000 persons respectively. If extended to the entire Navy, the analogous figures would be 30,000 and 40,000 persons.

Similar projections concerning readiness show that the typical gainer would move an additional 13 percentile points to the 63 percentile of the original readiness distribution), whereas the typical loser would drop an additional 24 percentile points, to the 26 percentile level. Training readiness, in particular, shows a remarkable gain (34 per cent) associated with previous positive NHRMS change.

Finally, an effort was undertaken to determine whether a common performance dimension underlay these many measures and which might serve as a common metric. The results suggested that it does not. Instead, there appeared to be three dimensions: readiness, reenlistment, and personnel outcomes (NJP, UA, etc.)

The general conclusions were the following

- . Multivariate predictions produce a substantial ability to forecast future performance.
- . The relationships extend much farther out in time than was previously realized.
- . There is an available procedure for converting anticipated gains and losses in organizational quality and functioning into anticipated gains and losses in unit performance.
- . Both size and time lags, these relationships across time appear to be remarkably similar to those found for civilian business organizations.

### OVERVIEW

This report presents a prototype current value human resource accounting system for application with Navy units. In contrast to the incurred cost or replacement cost methods, the current value system attributes value to an organization's human resources based on the observed relationship over time between measures of the human organization and the relevant performance outcomes of the organization. In this study, the relationships between HRMS data and from the Navy's Human Resource Management Survey (HRMS) and a wide range of performance outcomes are used to build a current value HRA system.

#### Current Value Human Resource Accounting

In theory, a current value HRA system has been a possibility for over 25 years. Early conceptual development and discussion (Likert, 1955; Hermanson, 1964; Brummet, et al., 1968; Caplan and Landekich, 1974) emphasized both the advantages of the current value approach over incurred cost or replacement cost methods, and the difficulty in applying such a system because of the tremendous amount of information that must be collected and analyzed.

The demonstration project presented in this report builds upon a series of earlier projects (Pecorella, et al., 1978), sponsored by the Navy Manpower Research and Development Program. That study demonstrated the feasibility of current value HRA in a set of private

organizations by combining data from ISR's Survey of Organizations archive with cost performance and absenteeism data from cost centers in a set of business firms. The equations relating gains and losses in the human organization to gains and losses in performance were used to attribute dollar values to the human organization, which were then discounted and capitalized. A second, more recent study has also extended current value HRA to a set of 34 business organizations using Survey of Organizations data combined with Standard and Poor's financial ratios (Denison, 1982; Denison, forthcoming). The sets of equations relating the characteristics of the human organizations to their financial performance is now being used to attribute value on an experimental basis to the inter-firm differences in human resource management practices.

The study described in this report replicates the findings from civilian industry on Navy units themselves and relies on a large data file assembled for a multi-purpose program of research conducted at the Institute for Social Research. This data set has several unique characteristics that allow for a more advanced current value HRA system than has previously been possible. Among those characteristics are:

- Multiple waves of survey data from the Navy's Human Resource Management Survey, an adaptation of the Survey of Organizations instrument.
- A large, representative sample of Navy units (N=174).



- Performance measures (quarterly and semi-annually) for up to five years, including: readiness ratings (FORSTAT), reenlistment rates, rates of non-judicial punishment, unauthorized absence and desertion.

This dataset allows for the current value HRA system presented in this report to address two critical issues in much greater detail than in prior studies. First, the multi-wave survey data and time series performance measures allow the analysis to focus on change. Change in the management system and its relation to change in performance can be addressed with greater detail and precision than previously has been possible. Second, the longitudinal nature of the performance measures makes it possible to examine the time lag associated with the relationship between the human organization and performance over a much longer period of time. These longitudinal analyses produce some of the most compelling findings yet regarding the impact of an organization's management system on its performance.

METHODOLOGY: THE SAMPLE, THE MEASURES AND THE METHODS

The sample used in this study included all units with two or more waves of HRMS data collected from July 1, 1978 until August 1981, when the actual sample selection began. This sample includes 67,100 respondents from 174 units and was provided to the ISR project staff by the Navy Personnel Research and Development Center. NPRDC and other Navy offices also provided the project with the following performance data: reenlistment rates, rates of unauthorized absence, non-judicial punishment, desertion, drug and marijuana offenses and readiness ratings (FORSTAT). Also provided, but summarized in other reports, were data on discharges made under Project Upgrade, and a small sample of Refresher Training (REFTRA) data (Bowers, 1983, Bowers and Krauz, 1983).

The sample drawn for this project appears to be highly representative of the fleet as a whole (Bowers, 1983). Documentation of the representativeness tests for the samples for both ships and aviation units from the interim report is presented in Appendix A. The survey measures for this sample were drawn from the Navy Human Resource Management Survey (NHRMS), an 88 item paper and pencil questionnaire administered to a unit as a first step in its human resource development cycle. A number of studies have been conducted that document the reliability of these survey measures and their relationship to unit performance

measures. The items that make up the 23 HRMS indexes and the alpha coefficients for each of those indexes are also presented in Appendix A.

#### Performance Measures

Unit performance measures were collected for as many of the units as possible and calculated in either semi-annual periods or calendar year quarters to achieve the necessary criterion stability (Drexler and Franklin, 1976). The performance measures, their reporting period, and the period over which the data were collected are listed in Table 1.

The data collection and computation of quarterly and semi-annual scores for the first three measures, reenlistment, unauthorized absence and desertion are discussed in the interim report (Bowers, 1983). The three remaining measures were derived as follows:

Non-judicial punishment rates were taken from each unit's records of "criminal activity, disciplinary infractions, and court martial reports" covering the period July 1, 1978 to September 30, 1982. The quarterly rate is the number of NJPs and civil convictions, divided by the E1-E7 complement for that particular unit. The drug and marijuana offense rate also taken from each unit's records of "criminal activity, disciplinary infraction and court martial reports" is composed of the total number accused of drug offenses, divided by the E1-E7 complement.

Table 1

Performance measures, Reporting periods, & Period of Data Collection

Performance Measure	Reporting Period	Period of Data Collection
Reenlistment	Quarterly	7/78 - 12/80
Unauthorized Absence	Semi-annual	10/78 - 10/81
Desertion	Semi-annual	10/78 - 10/81
Non-Judicial Punishment	Quarterly	7/78 - 9/82
Drug and Marijuana Offenses	Quarterly	7/78 - 9/82
Readiness	Quarterly	7/78 - 6/82

NJP and drug offense data were obtained for 54-108 units depending on the particular time period. These data were obtained from the Pacific Fleet only, and more of these data were available for more recent quarters than were available for years 1978-80.

Readiness ratings (FORSTAT) are recorded each time a change occurs in one of the five readiness states. To obtain a quarterly readiness score it was necessary to weight each rating by the number of days that it held constant, and then average scores across each quarters. Readiness data were available for 115 units in our sample.

All of these performance measures were first standardized within periods to control for the effects of seasonal and yearly variation. Thus, each unit was given a standard score that reflects its standing in relation to all other units within a given time period. The performance measures were then relativized with respect to the date when Wave 1 HRMS survey data were collected. That is, the periods immediately following a particular unit's W1 survey date become  $T_{+1}$ ,  $T_{+2}$ ,  $T_{+3}$ , etc. regardless of the actual date when these data were collected. This step is necessary in order to examine the lag effects associated with the relationship between the human organization and performance. Further discussion of standardization and relativization is provided by Bowers (1983) and Drexler and Franklin (1976).

### Overview of HRA and the Value Attribution Process

Given accurate and reliable measures of a human organization and its relevant performance outcomes, the construction of a current value human resource accounting system is basically a three step process (Pecorella, et al., 1978).

Predicting performance changes. The relationship between HRMS Wave 1 data and the subsequent performance periods ( $T_{+1}$ ,  $T_{+2}$ ,  $T_{+3}$ , etc.) is first estimated by a series of equations that relate the characteristics of the human organization to the resulting performance. These equations, along with W2 HRMS data, are then used to generate predicted unit performance scores for those performance periods following Wave 2 data collection (i.e.,  $T_{+1}'$ ,  $T_{+2}'$ ,  $T_{+3}'$ ). Thus, the expected performance level for a particular unit two years after HRMS Wave 2 is a function of: (1) the observed relationship (for the entire sample) between Wave 1 HRMS and performance two years later, and (2) Wave 2 HRMS scores for that unit. Comparing performance levels following Wave 1 ( $P_{+1}$ ,  $P_{+2}$ ,  $P_{+3}$ , etc.) with predicted performance levels following W2 ( $P'_{+1}$ ,  $P'_{+2}$ ,  $P'_{+3}$ , etc.) generates a set of predicted performance changes, by period, for each of the separate performance measures.

Criterion Change and Value Attribution. The predicted change scores, converted back to their actual metric (i.e., reenlistments, UAs, NJPs, readiness ratings) are then used to attribute value to changes in the human system. Ideally,

an increment of change in the human system as measured by survey scores can be translated directly into change in a performance measure that can then be expressed in a common metric. As Pecorella, et al., (1978) have shown, multiple performance criteria such as variable costs and absenteeism can be expressed in a common dollar metric. In this current study, value attributions have been made and summarized in terms of the original metric of the performance measures. No attempt has been made to provide a common metric. Converting readiness, reenlistment and NJPs to a common metric, for example, poses a difficult (yet not insoluble) problem on its own.

Capitalization and Discounting. Capitalization and discounting refers to the process of estimating the current value of an investment based on its expected future return. In a business investment,

"If a certain business were expected to yield an income of \$50,000 per year perpetually, and 10 percent were judged a fair rate of return upon an investment of that sort, then the value of the business would be \$500,000, the result being obtained by the capitalization of income." (Guthman and Dougall, 1955, p.76)

In this study, future gains have been taken as equal to current gains. There are arguments on both sides of this issue: e.g., reenlistment today may be worth more than reenlistment tomorrow; or in contrast, readiness tomorrow is sometimes worth more than readiness today. At the present time, no capitalization and discounting procedure is more convincing than the equal valuation strategy.

### RELATIONSHIPS BETWEEN HRMS DATA AND PERFORMANCE MEASURES

The core of the HRA value attribution process is in the relationship between the HRMS data and performance in subsequent time periods. In an interim report (Bowers, 1983), the relationships between HRMS data and reenlistment, unauthorized absence, desertion, and Upgrade percentage were reported in detail. The relationship of the HRMS survey data to performance in Refresher Training exercises for a small number of cases was also reported.

This section briefly describes these interim findings, and then presents the findings regarding the relationship between the HRMS survey data and rates of non-judicial punishment and drug and marijuana offenses, as well as the relationship between the HRMS data and the readiness ratings (FORSTAT).

#### HRMS and Reenlistment

The findings regarding both first-term and total-term reenlistment rates show an initial peak in the correlational relationship coming eight to eleven months after Wave 1 data were collected which usually falls in the .20 to .30 range. This is consistent with the findings previously reported by Drexler and Franklin (1976). A second peak in the relationship to both first-term and total-term reenlistment data occurs much later ( $T_{+7}$  to  $T_{+9}$ ), up to 27 months after Wave 1 survey data were collected. This gives evidence of



the same "two-humped" pattern demonstrated several times in civilian analyses (Pecorella, et al. 1978; Denison, 1982). These data are presented in Appendix A.

#### HRMS, Unauthorized Absence, and Desertion

Unauthorized Absence and Desertion follow a similar, but slightly different pattern. First, the correlational relationships are stronger than those for reenlistment, with most correlations falling in the  $-.30$  to  $-.60$  range. The two-hump pattern is apparent for the UA data with peaks at one year and two years. This pattern is less apparent for the Desertion data, which show a strong, consistent pattern averaging  $-.50$  that extends over two years. These data are also presented in Appendix A.

#### HRMS and Non-Judicial Punishment

Not included in the interim report (Bowers, 1983) were the basic correlational analyses for the quarterly data on non-judicial punishment. These data were available for the Pacific Fleet only, and thus the number of cases available for the analyses is somewhat lowered. The basic correlations for the NJP data are presented below in Table 2.

These data indicate that command climate indexes show a peak of relationship that is largely concurrent or immediately preceding Wave 1, followed by a decline in the relationships in later periods. Supervisor leadership indexes, especially Supervisory Support and Supervisory Team Coordination, display a different pattern. For these

**Table 2**  
**Correlations Between Non-Judicial Punishment Rates and Wave 1 HRMS Indexes**

and Wave 1 HRS INDEXES												
- 6509 (81)	- 9201 (81)	- 8869 (81)	- 3042 (81)	- 5512 (81)	- 7777 (81)	- 7613 (81)	- 6855 (81)	- 6543 (81)	- 6390 (81)	- 3103 (81)	- 5682 (81)	
- 3632 (91)	- 5876 (91)	- 6485 (91)	- 4744 (91)	- 2605 (91)	- 5252 (91)	- 6360 (91)	- 5620 (91)	- 3712 (91)	- 3670 (91)	- 0880 (91)	- 1700 (91)	
- 4403 (141)	- 6224 (141)	- 6150 (141)	- 4434 (141)	- 5294 (141)	- 7034 (141)	- 5878 (141)	- 5170 (141)	- 4371 (141)	- 5128 (141)	- 1742 (141)	- 3815 (141)	
- 4789 (241)	- 5201 (241)	- 5424 (241)	- 4936 (241)	- 4954 (241)	- 4573 (241)	- 4514 (241)	- 3674 (241)	- 3587 (241)	- 3411 (241)	- 2436 (241)	- 3975 (241)	
- 5979 (301)	- 5154 (301)	- 5379 (301)	- 5257 (301)	- 4051 (301)	- 4656 (301)	- 4637 (301)	- 4032 (301)	- 2775 (301)	- 3729 (301)	- 3511 (301)	- 4617 (301)	
- 5628 (441)	- 5337 (441)	- 5778 (441)	- 4934 (441)	- 5624 (441)	- 5824 (441)	- 5483 (441)	- 5024 (441)	- 4695 (441)	- 5567 (441)	- 4713 (441)	- 5240 (441)	
- 4859 (451)	- 4495 (451)	- 4577 (451)	- 7012 (451)	- 5922 (451)	- 5430 (451)	- 4878 (451)	- 3845 (451)	- 4857 (451)	- 4775 (451)	- 6155 (451)	- 6393 (451)	
- 4109 (541)	- 4006 (541)	- 3975 (541)	- 2173 (541)	- 5005 (541)	- 4606 (541)	- 4466 (541)	- 2991 (541)	- 4803 (541)	- 4339 (541)	- 5549 (541)	- 5839 (541)	
- 4130 (531)	- 3145 (531)	- 3577 (531)	- 2033 (531)	- 2953 (531)	- 5257 (531)	- 4666 (531)	- 4536 (531)	- 4136 (531)	- 4955 (531)	- 5823 (531)	- 6264 (531)	
- 4732 (621)	- 4728 (621)	- 5171 (621)	- 4380 (621)	- 5168 (621)	- 6212 (621)	- 5807 (621)	- 4468 (621)	- 5126 (621)	- 5043 (621)	- 4720 (621)	- 5746 (621)	
- 2850 (641)	- 2608 (641)	- 3242 (641)	- 2689 (641)	- 3269 (641)	- 5404 (641)	- 4895 (641)	- 3190 (641)	- 3318 (641)	- 3806 (641)	- 3978 (641)	- 3579 (641)	
- 2511 (741)	- 1862 (741)	- 2743 (741)	- 2243 (741)	- 2363 (741)	- 4356 (741)	- 4171 (741)	- 3054 (741)	- 2852 (741)	- 3559 (741)	- 3507 (741)	- 3934 (741)	
- 3287 (791)	- 2440 (791)	- 3360 (791)	- 2530 (791)	- 2975 (791)	- 4768 (791)	- 4432 (791)	- 3435 (791)	- 3788 (791)	- 3285 (791)	- 3782 (791)	- 3874 (791)	
- 3746 (801)	- 3515 (801)	- 4395 (801)	- 3915 (801)	- 4154 (801)	- 5352 (801)	- 5320 (801)	- 4116 (801)	- 4470 (801)	- 4814 (801)	- 5141 (801)	- 5239 (801)	
- 3460 (811)	- 3094 (811)	- 3748 (811)	- 2819 (811)	- 3549 (811)	- 5645 (811)	- 5380 (811)	- 4080 (811)	- 4527 (811)	- 4536 (811)	- 4739 (811)	- 5118 (811)	
- 2703 (811)	- 2657 (811)	- 3248 (811)	- 2868 (811)	- 3129 (811)	- 4525 (811)	- 4243 (811)	- 3406 (811)	- 4105 (811)	- 3492 (811)	- 4522 (811)	- 3736 (811)	
- 4222 (671)	- 4095 (671)	- 4890 (671)	- 4677 (671)	- 4036 (671)	- 5183 (671)	- 5510 (671)	- 4512 (671)	- 4254 (671)	- 4874 (671)	- 4653 (671)	- 5143 (671)	
- 3237 (611)	- 3495 (611)	- 3752 (611)	- 3541 (611)	- 3168 (611)	- 5163 (611)	- 4825 (611)	- 3890 (611)	- 4205 (611)	- 4139 (611)	- 4385 (611)	- 4382 (611)	
- 3313 (541)	- 2724 (541)	- 3747 (541)	- 3576 (541)	- 2739 (541)	- 4225 (541)	- 4274 (541)	- 3559 (541)	- 4115 (541)	- 3963 (541)	- 2766 (541)	- 3209 (541)	
- 4472 (441)	- 3941 (441)	- 5003 (441)	- 4667 (441)	- 4054 (441)	- 5136 (441)	- 4504 (441)	- 2997 (441)	- 3452 (441)	- 4266 (441)	- 4653 (441)	- 4841 (441)	
- 4181 (371)	- 3642 (371)	- 3767 (371)	- 3600 (371)	- 3182 (371)	- 4198 (371)	- 3234 (371)	- 1135 (371)	- 0551 (371)	- 2545 (371)	- 1504 (371)	- 3836 (371)	
- 3131 (221)	- 3558 (221)	- 3826 (221)	- 3363 (221)	- 3540 (221)	- 3589 (221)	- 2223 (221)	- 0235 (221)	- 1646 (221)	- 2261 (221)	- 2190 (221)	- 2250 (221)	
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WGRP 567 WGRP 568 WGRP 569 WGRP 570 WGRP 571 WGRP 572 WGRP 573 WGRP 574 WGRP 575 WGRP 576 WGRP 577 WGRP 578 WGRP 579 WGRP 580 WGRP 581 WGRP 582 WGRP 583 WGRP 584 WGRP 585 WGRP 586 WGRP 587 WGRP 588 WGRP 589 WGRP 590 WGRP 591 WGRP 592 WGRP 593 WGRP 594 WGRP 595 WGRP 596 WGRP 597 WGRP 598 WGRP 599 WGRP 600 WGRP 601 WGRP 602 WGRP 603 WGRP 604 WGRP 605 WGRP 606 WGRP 607 WGRP 608 WGRP 609 WGRP 610 WGRP 611 WGRP 612 WGRP 613 WGRP 614 WGRP 615 WGRP 616 WGRP 617 WGRP 618 WGRP 619 WGRP 620 WGRP 621 WGRP 622 WGRP 623 WGRP 624 WGRP 625 WGRP 626 WGRP 627 WGRP 628 WGRP 629 WGRP 630 WGRP 631 WGRP 632 WGRP 633 WGRP 634 WGRP 635 WGRP 636 WGRP 637 WGRP 638 WGRP 639 WGRP 640 WGRP 641 WGRP 642 WGRP 643 WGRP 644 WGRP 645 WGRP 646 WGRP 647 WGRP 648 WGRP 649 WGRP 650 WGRP 651 WGRP 652 WGRP 653 WGRP 654 WGRP 655 WGRP 656 WGRP 657 WGRP 658 WGRP 659 WGRP 660 WGRP 661 WGRP 662 WGRP 663 WGRP 664 WGRP 665 WGRP 666 WGRP 667 WGRP 668 WGRP 669 WGRP 670 WGRP 671 WGRP 672 WGRP 673 WGRP 674 WGRP 675 WGRP 676 WGRP 677 WGRP 678 WGRP 679 WGRP 680 WGRP 681 WGRP 682 WGRP 683 WGRP 684 WGRP 685 WGRP 686 WGRP 687 WGRP 688 WGRP 689 WGRP 690 WGRP 691 WGRP 692 WGRP 693 WGRP 694 WGRP 695 WGRP 696 WGRP 697 WGRP 698 WGRP 699 WGRP 700 WGRP 701 WGRP 702 WGRP 703 WGRP 704 WGRP 705 WGRP 706 WGRP 707 WGRP 708 WGRP 709 WGRP 710 WGRP 711 WGRP 712 WGRP 713 WGRP 714 WGRP 715 WGRP 716 WGRP 717 WGRP 718 WGRP 719 WGRP 720 WGRP 721 WGRP 722 WGRP 723 WGRP 724 WGRP 725 WGRP 726 WGRP 727 WGRP 728 WGRP 729 WGRP 730 WGRP 731 WGRP 732 WGRP 733 WGRP 734 WGRP 735 WGRP 736 WGRP 737 WGRP 738 WGRP 739 WGRP 740 WGRP 741 WGRP 742 WGRP 743 WGRP 744 WGRP 745 WGRP 746 WGRP 747 WGRP 748 WGRP 749 WGRP 750 WGRP 751 WGRP 752 WGRP 753 WGRP 754 WGRP 755 WGRP 756 WGRP 757 WGRP 758 WGRP 759 WGRP 760 WGRP 761 WGRP 762 WGRP 763 WGRP 764 WGRP 765 WGRP 766 WGRP 767 WGRP 768 WGRP 769 WGRP 770 WGRP 771 WGRP 772 WGRP 773 WGRP 774 WGRP 775 WGRP 776 WGRP 777 WGRP 778 WGRP 779 WGRP 780 WGRP 781 WGRP 782 WGRP 783 WGRP 784 WGRP 785 WGRP 786 WGRP 787 WGRP 788 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WGRP 900 WGRP 901 WGRP 902 WGRP 903 WGRP 904 WGRP 905 WGRP 906 WGRP 907 WGRP 908 WGRP 909 WGRP 910 WGRP 911 WGRP 912 WGRP 913 WGRP 914 WGRP 915 WGRP 916 WGRP 917 WGRP 918 WGRP 919 WGRP 920 WGRP 921 WGRP 922 WGRP 923 WGRP 924 WGRP 925 WGRP 926 WGRP 927 WGRP 928 WGRP 929 WGRP 930 WGRP 931 WGRP 932 WGRP 933 WGRP 934 WGRP 935 WGRP 936 WGRP 937 WGRP 938 WGRP 939 WGRP 940 WGRP 941 WGRP 942 WGRP 943 WGRP 944 WGRP 945 WGRP 946 WGRP 947 WGRP 948 WGRP 949 WGRP 950 WGRP 951 WGRP 952 WGRP 953 WGRP 954 WGRP 955 WGRP 956 WGRP 957 WGRP 958 WGRP 959 WGRP 960 WGRP 961 WGRP 962 WGRP 963 WGRP 964 WGRP 965 WGRP 966 WGRP 967 WGRP 968 WGRP 969 WGRP 970 WGRP 971 WGRP 972 WGRP 973 WGRP 974 WGRP 975 WGRP 976 WGRP 977 WGRP 978 WGRP 979 WGRP 980 WGRP 981 WGRP 982 WGRP 983 WGRP 984 WGRP 985 WGRP 986 WGRP 987 WGRP 988 WGRP 989 WGRP 990 WGRP 991 WGRP 992 WGRP 993 WGRP 994 WGRP 995 WGRP 996 WGRP 997 WGRP 998 WGRP 999 WGRP 1000 WGRP 1001 WGRP 1002 WGRP 1003 WGRP 1004 WGRP 1005 WGRP 1006 WGRP 1007 WGRP 1008 WGRP 1009 WGRP 1010 WGRP 1011 WGRP 1012 WGRP 1013 WGRP 1014 WGRP 1015 WGRP 1016 WGRP 1017 WGRP 1018 WGRP 1019 WGRP 1020 WGRP 1021 WGRP 1022 WGRP 1023 WGRP 1024 WGRP 1025 WGRP 1026 WGRP 1027 WGRP 1028 WGRP 1029 WGRP 1030 WGRP 1031 WGRP 1032 WGRP 1033 WGRP 1034 WGRP 1035 WGRP 1036 WGRP 1037 WGRP 1038 WGRP 1039 WGRP 1040 WGRP 1041 WGRP 1042 WGRP 1043 WGRP 1044 WGRP 1045 WGRP 1046 WGRP 1047 WGRP 1048 WGRP 1049 WGRP 1050 WGRP 1051 WGRP 1052 WGRP 1053 WGRP 1054 WGRP 1055 WGRP 1056 WGRP 1057 WGRP 1058 WGRP 1059 WGRP 1060 WGRP 1061 WGRP 1062 WGRP 1063 WGRP 1064 WGRP 1065 WGRP 1066 WGRP 1067 WGRP 1068 WGRP 1069 WGRP 1070 WGRP 1071 WGRP 1072 WGRP 1073 WGRP 1074 WGRP 1075 WGRP 1076 WGRP 1077 WGRP 1078 WGRP 1079 WGRP 1080 WGRP 1081 WGRP 1082 WGRP 1083 WGRP 1084 WGRP 1085 WGRP 1086 WGRP 1087 WGRP 1088 WGRP 1089 WGRP 1090 WGRP 1091 WGRP 1092 WGRP 1093 WGRP 1094 WGRP 1095 WGRP 1096 WGRP 1097 WGRP 1098 WGRP 1099 WGRP 1100 WGRP 1101 WGRP 1102 WGRP 1103 WGRP 1104 WGRP 1105 WGRP 1106 WGRP 1107 WGRP 1108 WGRP 1109 WGRP 1110 WGRP 1111 WGRP 1112 WGRP 1113 WGRP 1114 WGRP 1115 WGRP 1116 WGRP 1117 WGRP 1118 WGRP 1119 WGRP 1120 WGRP 1121 WGRP 1122 WGRP 1123 WGRP 1124 WGRP												

Table 2 (continued)

7105 NUPSM5	-5246 (81)	-7859 (81)	-5056 (81)	-5457 (81)	-2553 (71)	-6189 (81)	-7384 (81)	-6049 (81)	-9077 (81)
7106 NUPSM4	-6710 (91)	-6634 (91)	-5488 (91)	-1504 (91)	-1866 (81)	-3509 (91)	-4746 (91)	-5757 (91)	-5833 (91)
7107 NUPSM3	-5430 (114)	-6341 (114)	-4155 (114)	-4445 (114)	-2733 (112)	-6230 (114)	-7253 (114)	-6024 (114)	-6479 (114)
7108 NUPSM2	-5070 (124)	-5776 (124)	-4708 (124)	-4391 (124)	-4097 (122)	-4368 (124)	-6097 (124)	-5784 (124)	-6262 (124)
7109 NUPSM1	-4791 (130)	-6169 (130)	-5735 (130)	-4401 (130)	-3362 (125)	-3913 (130)	-5911 (130)	-4804 (130)	-6772 (130)
7110 NUPSO	-4034 (144)	-5868 (144)	-5166 (144)	-5178 (144)	-4290 (137)	-5680 (144)	-6553 (144)	-4488 (144)	-6230 (144)
7111 NUPSI1	-2930 (145)	-5539 (145)	-4144 (145)	-6552 (145)	-6149 (140)	-5547 (145)	-6165 (145)	-2775 (145)	-5817 (145)
7112 NUPSI2	-2409 (154)	-4450 (154)	-3262 (154)	-5797 (154)	-5362 (145)	-5437 (154)	-4928 (154)	-1351 (154)	-4604 (154)
7113 NUPSI3	-2150 (153)	-5258 (153)	-4255 (153)	-6184 (153)	-5165 (144)	-4628 (153)	-5083 (153)	-2238 (153)	-4040 (153)
7114 NUPSI4	-5027 (162)	-6777 (162)	-5201 (162)	-6129 (162)	-5895 (151)	-6618 (162)	-6307 (162)	-4270 (162)	-6128 (162)
7115 NUPSI5	-2978 (164)	-4084 (164)	-3183 (164)	-3809 (164)	-2839 (153)	-3886 (164)	-4029 (164)	-2143 (164)	-3882 (164)
7116 NUPSI6	-1763 (174)	-3658 (174)	-3278 (174)	-3648 (174)	-2985 (161)	-3277 (174)	-3780 (174)	-1234 (174)	-3306 (174)
7117 NUPSI7	-3445 (179)	-4871 (179)	-3980 (179)	-3896 (179)	-3453 (165)	-3848 (179)	-3889 (179)	-1611 (179)	-4101 (179)
7118 NUPSI8	-5160 (180)	-5609 (180)	-4901 (180)	-5130 (180)	-3838 (167)	-4851 (180)	-5522 (180)	-3312 (180)	-4929 (180)
7119 NUPSI9	-3752 (181)	-5508 (181)	-4938 (181)	-4729 (181)	-4100 (167)	-4378 (181)	-4919 (181)	-2650 (181)	-4831 (181)
7120 NUPSI10	-3009 (181)	-3838 (181)	-3376 (181)	-3800 (181)	-3248 (171)	-3571 (181)	-3924 (181)	-2108 (181)	-3616 (181)
7121 NUPSI11	-4471 (167)	-5399 (167)	-4601 (167)	-4326 (167)	-3356 (157)	-5379 (167)	-5027 (167)	-4126 (167)	-5187 (167)
7122 NUPSI12	-3210 (161)	-4528 (161)	-4394 (161)	-4652 (161)	-3898 (151)	-4181 (161)	-4487 (161)	-3268 (161)	-4192 (161)
7123 NUPSI13	-2893 (154)	-4075 (154)	-3479 (154)	-3195 (154)	-2932 (146)	-4617 (154)	-3469 (154)	-2562 (154)	-3308 (154)
7124 NUPSI14	-4107 (144)	-5349 (144)	-4835 (144)	-4960 (144)	-5459 (139)	-4685 (144)	-5054 (144)	-3568 (144)	-4949 (144)
7125 NUPSI15	-3404 (131)	-4658 (131)	-4077 (131)	-4477 (131)	-5366 (127)	-3709 (131)	-3707 (131)	-2585 (131)	-4177 (131)
7126 NUPSI16	-2572 (122)	-3617 (122)	-3020 (122)	-3635 (122)	-7132 (120)	-2770 (122)	-3662 (122)	-2372 (122)	-3528 (122)
140	141	142	143	144	145	146	147	148	149

140 NUPSI16 NUPSI17 NUPSI18 NUPSI19 NUPSI20 NUPSI21 NUPSI22 NUPSI23 NUPSI24 NUPSI25 NUPSI26 NUPSI27 NUPSI28 NUPSI29 NUPSI30 NUPSI31 NUPSI32 NUPSI33 NUPSI34 NUPSI35 NUPSI36 NUPSI37 NUPSI38 NUPSI39 NUPSI40 NUPSI41 NUPSI42 NUPSI43 NUPSI44 NUPSI45 NUPSI46 NUPSI47 NUPSI48 NUPSI49 NUPSI50 NUPSI51 NUPSI52 NUPSI53 NUPSI54 NUPSI55 NUPSI56 NUPSI57 NUPSI58 NUPSI59 NUPSI60 NUPSI61 NUPSI62 NUPSI63 NUPSI64 NUPSI65 NUPSI66 NUPSI67 NUPSI68 NUPSI69 NUPSI70 NUPSI71 NUPSI72 NUPSI73 NUPSI74 NUPSI75 NUPSI76 NUPSI77 NUPSI78 NUPSI79 NUPSI80 NUPSI81 NUPSI82 NUPSI83 NUPSI84 NUPSI85 NUPSI86 NUPSI87 NUPSI88 NUPSI89 NUPSI90 NUPSI91 NUPSI92 NUPSI93 NUPSI94 NUPSI95 NUPSI96 NUPSI97 NUPSI98 NUPSI99 NUPSI100

measures, there is a peak in periods T+3 and T+4, followed by a second peak in periods T+9 through T+12, a pattern also followed by work group and peer relations measures. The peak coefficients, furthermore, are substantial: they fall in the .50 to .60 range.

#### HRMS and Drug and Marijuana Offenses

A special subset of the NJP data, also available only for the Pacific Fleet, focuses on the drug and marijuana offenses. These data were also available on a quarterly basis. The correlations between HRMS data and the incidence of drug and marijuana offenses are presented in Table 3.

A pattern somewhat different from that obtaining for overall NJP occurs for this specific category of offenses. Command climate indexes show rather consistent, moderate coefficients across most time periods except T0 to T+3, in which periods they decline. Supervisory leadership indexes, on the other hand, show a peak in periods T+5 through T+9, and workgroup/peer indexes a peak in periods T+7 through T+14. Both of the latter categories of indexes show coefficients that are somewhat larger than those for command climate, and both show the same decline in relationships in periods T0 and T+1.

Table 3  
Correlations Between Drug and Marijuana Offenses  
and Wave 1 HRMS Indexes

VARIABLE	1303 (8)	-0554 (8)	-1226 (8)	-3731 (8)	-5747 (8)	-3428 (8)	-0722 (8)	-1946 (8)	-5484 (8)	-2043 (8)	-2098 (8)	-2836 (8)	
7205.DMOSM5	1303 (8)	-0554 (8)	-1226 (8)	-3731 (8)	-5747 (8)	-3428 (8)	-0722 (8)	-1946 (8)	-5484 (8)	-2043 (8)	-2098 (8)	-2836 (8)	
7206.DMOSM4	2570 (9)	0699 (9)	-0339 (9)	-1347 (9)	-3523 (9)	-1117 (9)	0060 (9)	-0179 (9)	-2701 (9)	0688 (9)	-0574 (9)	-0116 (9)	
7207.DMOSM3	-2048 (14)	-1460 (14)	-2012 (14)	-0784 (14)	-0078 (14)	-1467 (14)	-1305 (14)	-0958 (14)	-0452 (14)	-0606 (14)	-1400 (14)	-2057 (14)	
7208.DMOSM2	-1240 (24)	-1109 (24)	-1174 (24)	-1215 (24)	-1229 (24)	-1035 (24)	-0764 (24)	-0696 (24)	-0987 (24)	-0253 (24)	-0541 (24)	-0824 (24)	
7209.DMOSM1	-3461 (30)	-2949 (30)	-3085 (30)	-2971 (30)	-2520 (30)	-1997 (30)	-2369 (30)	-2569 (30)	-1815 (30)	-1253 (30)	-2285 (30)	-3021 (30)	
7210.DMOSO	-0622 (44)	-0869 (44)	-0900 (44)	-0478 (44)	-1152 (44)	-2084 (44)	-2340 (44)	-2052 (44)	-1335 (44)	-2373 (44)	-0773 (44)	-0122 (44)	
7211.DMOS1	-1328 (45)	-1437 (45)	-1342 (45)	-0595 (45)	-1507 (45)	-1216 (45)	-1795 (45)	-1567 (45)	-1539 (45)	-1721 (45)	-2655 (45)	-2091 (45)	
7212.DMOS2	-1920 (54)	-1690 (54)	-1881 (54)	-1206 (54)	-2583 (54)	-4227 (54)	-3907 (54)	-2597 (54)	-3276 (54)	-2715 (54)	-3414 (54)	-3587 (54)	
7213.DMOS3	-2124 (53)	-1660 (53)	-1761 (53)	-1525 (53)	-1026 (53)	-2561 (53)	-2250 (53)	-1633 (53)	-0573 (53)	-1613 (53)	-1322 (53)	-2187 (53)	
7214.DMOS4	-3186 (62)	-3250 (62)	-3098 (62)	-2991 (62)	-3171 (62)	-3463 (62)	-3877 (62)	-2302 (62)	-2195 (62)	-2610 (62)	-2028 (62)	-2766 (62)	
7215.DMOS5	-4040 (64)	-3947 (64)	-4241 (64)	-3805 (64)	-4467 (64)	-5398 (64)	-5100 (64)	-3924 (64)	-4296 (64)	-4154 (64)	-4788 (64)	-4343 (64)	
7216.DMOS6	-2289 (74)	-1463 (74)	-2369 (74)	-1965 (74)	-1338 (74)	-2250 (74)	-2445 (74)	-2461 (74)	-1745 (74)	-1972 (74)	-2754 (74)	-3150 (74)	
7217.DMOS7	-3877 (78)	-3426 (78)	-3813 (78)	-3211 (78)	-3273 (78)	-4604 (78)	-4500 (78)	-3400 (78)	-3549 (78)	-3523 (78)	-2959 (78)	-3566 (78)	
7218.DMOS8	-2348 (80)	-2522 (80)	-3056 (80)	-2516 (80)	-2776 (80)	-3959 (80)	-3813 (80)	-2525 (80)	-2824 (80)	-3260 (80)	-3906 (80)	-3633 (80)	
7219.DMOS9	-3181 (81)	-3049 (81)	-3978 (81)	-3003 (81)	-3487 (81)	-5520 (81)	-5495 (81)	-4345 (81)	-4661 (81)	-4356 (81)	-3758 (81)	-4864 (81)	
7220.DMOS10	-3479 (81)	-3377 (81)	-3265 (81)	-3202 (81)	-3148 (81)	-2377 (81)	-3270 (81)	-2671 (81)	-2813 (81)	-2479 (81)	-3412 (81)	-2818 (81)	
7221.DMOS11	-4287 (67)	-3624 (67)	-4402 (67)	-4134 (67)	-3639 (67)	-4505 (67)	-4892 (67)	-3607 (67)	-3794 (67)	-4182 (67)	-4457 (67)	-4594 (67)	
7222.DMOS12	-3073 (61)	-2996 (61)	-3171 (61)	-2996 (61)	-3139 (61)	-4379 (61)	-4244 (61)	-3171 (61)	-3998 (61)	-3456 (61)	-4617 (61)	-4593 (61)	
7223.DMOS13	-3347 (54)	-2557 (54)	-3739 (54)	-3578 (54)	-2191 (54)	-3389 (54)	-3960 (54)	-3796 (54)	-3791 (54)	-4079 (54)	-2579 (54)	-3334 (54)	
7224.DMOS14	-4265 (44)	-3783 (44)	-4240 (44)	-4102 (44)	-3660 (44)	-4096 (44)	-3508 (44)	-2224 (44)	-2288 (44)	-3451 (44)	-4562 (44)	-4423 (44)	
7225.DMOS15	-3207 (33)	-2931 (33)	-3118 (33)	-3226 (33)	-2820 (33)	-3955 (33)	-3715 (33)	-1773 (33)	-0914 (33)	-3621 (33)	-1387 (33)	-4357 (33)	
7226.DMOS16	-3458 (22)	-3929 (22)	-4317 (22)	-3916 (22)	-3756 (22)	-4189 (22)	-3476 (22)	-3800 (22)	-4707 (22)	-4399 (22)	-5436 (22)	-5451 (22)	
127	128	129	130	131	132	133	134	135	136	137	138	139	
1	COMM F 2 DEC M4	3	MOTIV4	4	NUM RE 5	PAIR-E 7	SUP SU 8	SUP TE 9	SUP TE 10	SUP G 11	SUP W 12	WKGRP 13	WKGRP 13

Table 3 (Continued)

7205 DMOSM5	-1338 (8)	-2124 (8)	-4113 (8)	-4472 (8)	-8318 (7)	-4771 (8)	-3181 (8)	-5944 (8)	-1680 (8)	-1240 (8)
7206 DMOSM4	-2371 (9)	-1153 (9)	2429 (9)	-1627 (9)	-5507 (8)	-2782 (9)	-1090 (9)	-2547 (9)	-1883 (9)	-0756 (9)
7207 DMOSM3	-1592 (14)	-0098 (14)	-0621 (14)	-0932 (14)	-0807 (12)	0166 (14)	-2735 (14)	-0314 (14)	-0304 (14)	-2347 (14)
7208 DMOSM2	-0857 (24)	-1416 (24)	-0557 (24)	-2249 (24)	-3436 (22)	-1046 (24)	-1600 (24)	-0441 (24)	-1054 (24)	-1698 (24)
7209 DMOSM1	-3506 (30)	-3585 (30)	-3377 (30)	-2755 (30)	-2716 (25)	-1563 (30)	-3684 (30)	-3033 (30)	-2796 (30)	-4441 (30)
7210 DMOSO	-0643 (44)	-0110 (44)	-0111 (44)	-0316 (44)	-1491 (37)	-0604 (44)	-0932 (44)	0044 (44)	0239 (44)	-0822 (44)
7211 DMOS1	-0449 (45)	-1661 (45)	-2044 (45)	-1791 (45)	-0867 (40)	-1318 (45)	-2261 (45)	-0940 (45)	0395 (45)	-2269 (45)
7212 DMOS2	-2013 (54)	-3166 (54)	-3055 (54)	-3070 (54)	-2476 (45)	-2752 (54)	-2635 (54)	-1474 (54)	-0595 (54)	-3296 (54)
7213 DMOS3	-1778 (53)	-2712 (53)	-2198 (53)	-2211 (53)	-1563 (44)	-2159 (53)	-1709 (53)	-1308 (53)	-1190 (53)	-2076 (53)
7214 DMOS4	-2885 (62)	-3396 (62)	-2987 (62)	-2834 (62)	-1925 (51)	-3274 (62)	-3593 (62)	-2815 (62)	-2018 (62)	-3629 (62)
7215 DMOS5	-3861 (64)	-4862 (64)	-3956 (64)	-4880 (64)	-4660 (53)	-4790 (64)	-5139 (64)	-1744 (64)	-3839 (64)	-5158 (64)
7216 DMOS6	-1912 (74)	-3022 (74)	-2897 (74)	-2978 (74)	-3451 (61)	-2817 (74)	-3171 (74)	-2234 (74)	-1277 (74)	-3182 (74)
7217 DMOS7	-3828 (78)	-5252 (78)	-4398 (78)	-4235 (78)	-3830 (65)	-3896 (78)	-4402 (78)	-3373 (78)	-3513 (78)	-4558 (78)
7218 DMOS6	-3208 (80)	-3865 (80)	-3613 (80)	-3798 (80)	-2980 (67)	-3212 (80)	-4153 (80)	-2714 (80)	-3217 (80)	-3535 (80)
7219 DMOS9	-4445 (81)	-5553 (81)	-4981 (81)	-4603 (81)	-4186 (67)	-4740 (81)	-4924 (81)	-3687 (81)	-3844 (81)	-4470 (81)
7220 DMOS10	-3585 (81)	-2682 (81)	-2629 (81)	-2987 (81)	-1573 (71)	-2282 (81)	-3610 (81)	-2353 (81)	-2307 (81)	-3462 (81)
7221 DMOS11	-3960 (67)	-5114 (67)	-4607 (67)	-3997 (67)	-3376 (57)	-4394 (67)	-4773 (67)	-3780 (67)	-4066 (67)	-5177 (67)
7222 DMOS12	-3331 (61)	-4876 (61)	-4524 (61)	-4500 (61)	-5423 (51)	-3377 (61)	-4206 (61)	-3090 (61)	-3306 (61)	-4195 (61)
7223 DMOS13	2660 (54)	-3402 (54)	-3500 (54)	-2726 (54)	-2418 (46)	-3579 (54)	-3693 (54)	-3888 (54)	-3366 (54)	-2983 (54)
7224 DMOS14	-3722 (44)	-4744 (44)	-4738 (44)	-4452 (44)	-4737 (39)	-3750 (44)	-4560 (44)	-4441 (44)	-3263 (44)	-4485 (44)
7225 DMOS15	-3298 (33)	-4512 (33)	-4665 (33)	-4160 (33)	-4585 (27)	-3681 (33)	-3501 (33)	-3221 (33)	-2697 (33)	-3174 (33)
7226 DMOS16	-5276 (22)	-5146 (22)	-4808 (22)	-5570 (22)	-5183 (20)	-3172 (22)	-5138 (22)	-5662 (22)	-3502 (22)	-3337 (22)

140 WGRAP 15 WGRAP 16 WGRAP 17 WGRAP 18 WGRAP 19 WGRAP 20 SALLS 21 10WGR 22 10RAIN 23 EQUAI

HRMS and Readiness Data (FORSTAT)

The Readiness of each unit is assessed on five different dimensions: Overall Readiness, Equipment Readiness, Supply Readiness, Training Readiness, and Personnel Readiness. These data were available for the entire fleet and for a large proportion of the units represented in the project sample of 174 Navy units. Quarterly averages were computed from the basic data, standardized, relativized, and then added to the project data file. The basic correlations between the HRMS data and readiness measures are presented in Tables 4A through 4E.

The pattern in the data for these five measures is clear and consistent. Equipment, Supplies, and Personnel Readiness present coefficients in nearly all time periods that are mixed in direction, small in size, and often not significant. Training Readiness, on the other hand, shows coefficients which peak at substantial size (.50 to .60) in periods T+7 through T+14. Overall Readiness, the more global measure, shows coefficients of more modest size,, peaking in periods T+6 through T+8.



Table 4A  
Correlations Between Overall Readiness Ratings  
and Wave 1 HRMS Indexes

[illegible]



Table 4A (Continued)

[illegible]

**Table 4B**  
**Correlations Between Equipment Readiness Ratings**  
**and HRHS Wave 1 Indexes**

VARIABLE	8102 EOSM8	8103 EOSM7	8104 EOSM6	8105 EOSM5	8106 EOSM4	8107 EOSM3	8108 EOSM2	8109 EOSM1	8110 EOS0	8111 EOS1	8112 EOS2	8113 EOS3	8114 EOS4	8115 EOS5	8116 EOS6	8117 EOS7	8118 EOS8	8119 EOS9	8120 EOS10	8121 EOS11	8122 EOS12	8123 EOS17	8124 EOS14	8125 EOS15
	-0 (1)	-0 (2)	-0 (8)	-0 (13)	-0 (26)	-0 (34)	-0 (55)	-0 (61)	-0 (82)	-0 (81)	-0 (82)	-0 (85)	-0 (81)	-0 (83)	-0 (84)	-0 (83)	-0 (83)	-0 (84)	-0 (78)	-0 (67)	-0 (56)	-0 (45)	-0 (27)	-0 (12)
	1.0000 (2)	1.0000 (2)	1.0000 (8)	1.0000 (13)	1.0000 (26)	1.0000 (34)	1.0000 (55)	1.0000 (61)	1.0000 (82)	1.0000 (81)	1.0000 (82)	1.0000 (85)	1.0000 (81)	1.0000 (83)	1.0000 (84)	1.0000 (83)	1.0000 (83)	1.0000 (84)	1.0000 (78)	1.0000 (67)	1.0000 (56)	1.0000 (45)	1.0000 (27)	1.0000 (12)
	-1.0000 (2)	-1.0000 (2)	-1.0000 (8)	-1.0000 (13)	-1.0000 (26)	-1.0000 (34)	-1.0000 (55)	-1.0000 (61)	-1.0000 (82)	-1.0000 (81)	-1.0000 (82)	-1.0000 (85)	-1.0000 (81)	-1.0000 (83)	-1.0000 (84)	-1.0000 (83)	-1.0000 (83)	-1.0000 (84)	-1.0000 (78)	-1.0000 (67)	-1.0000 (56)	-1.0000 (45)	-1.0000 (27)	-1.0000 (12)
	0.0000 (1)	0.0000 (2)	0.0000 (8)	0.0000 (13)	0.0000 (26)	0.0000 (34)	0.0000 (55)	0.0000 (61)	0.0000 (82)	0.0000 (81)	0.0000 (82)	0.0000 (85)	0.0000 (81)	0.0000 (83)	0.0000 (84)	0.0000 (83)	0.0000 (83)	0.0000 (84)	0.0000 (78)	0.0000 (67)	0.0000 (56)	0.0000 (45)	0.0000 (27)	0.0000 (12)
	-0.0000 (1)	-0.0000 (2)	-0.0000 (8)	-0.0000 (13)	-0.0000 (26)	-0.0000 (34)	-0.0000 (55)	-0.0000 (61)	-0.0000 (82)	-0.0000 (81)	-0.0000 (82)	-0.0000 (85)	-0.0000 (81)	-0.0000 (83)	-0.0000 (84)	-0.0000 (83)	-0.0000 (83)	-0.0000 (84)	-0.0000 (78)	-0.0000 (67)	-0.0000 (56)	-0.0000 (45)	-0.0000 (27)	-0.0000 (12)
	0.0000 (1)	0.0000 (2)	0.0000 (8)	0.0000 (13)	0.0000 (26)	0.0000 (34)	0.0000 (55)	0.0000 (61)	0.0000 (82)	0.0000 (81)	0.0000 (82)	0.0000 (85)	0.0000 (81)	0.0000 (83)	0.0000 (84)	0.0000 (83)	0.0000 (83)	0.0000 (84)	0.0000 (78)	0.0000 (67)	0.0000 (56)	0.0000 (45)	0.0000 (27)	0.0000 (12)
	-0.0000 (1)	-0.0000 (2)	-0.0000 (8)	-0.0000 (13)	-0.0000 (26)	-0.0000 (34)	-0.0000 (55)	-0.0000 (61)	-0.0000 (82)	-0.0000 (81)	-0.0000 (82)	-0.0000 (85)	-0.0000 (81)	-0.0000 (83)	-0.0000 (84)	-0.0000 (83)	-0.0000 (83)	-0.0000 (84)	-0.0000 (78)	-0.0000 (67)	-0.0000 (56)	-0.0000 (45)	-0.0000 (27)	-0.0000 (12)
	0.0000 (1)	0.0000 (2)	0.0000 (8)	0.0000 (13)	0.0000 (26)	0.0000 (34)	0.0000 (55)	0.0000 (61)	0.0000 (82)	0.0000 (81)	0.0000 (82)	0.0000 (85)	0.0000 (81)	0.0000 (83)	0.0000 (84)	0.0000 (83)	0.0000 (83)	0.0000 (84)	0.0000 (78)	0.0000 (67)	0.0000 (56)	0.0000 (45)	0.0000 (27)	0.0000 (12)
	-0.0000 (1)	-0.0000 (2)	-0.0000 (8)	-0.0000 (13)	-0.0000 (26)	-0.0000 (34)	-0.0000 (55)	-0.0000 (61)	-0.0000 (82)	-0.0000 (81)	-0.0000 (82)	-0.0000 (85)	-0.0000 (81)	-0.0000 (83)	-0.0000 (84)	-0.0000 (83)	-0.0000 (83)	-0.0000 (84)	-0.0000 (78)	-0.0000 (67)	-0.0000 (56)	-0.0000 (45)	-0.0000 (27)	-0.0000 (12)
	0.0000 (1)	0.0000 (2)	0.0000 (8)	0.0000 (13)	0.0000 (26)	0.0000 (34)	0.0000 (55)	0.0000 (61)	0.0000 (82)	0.0000 (81)	0.0000 (82)	0.0000 (85)	0.0000 (81)	0.0000 (83)	0.0000 (84)	0.0000 (83)	0.0000 (83)	0.0000 (84)	0.0000 (78)	0.0000 (67)	0.0000 (56)	0.0000 (45)	0.0000 (27)	0.0000 (12)

Table 48 (Continued)

Table 4C

[illegible]

Table 4C (Continued)

Table 4D

VARIABLE	-0 (1)	-0 (2)	-0 (1)	-0 (2)	-0 (1)	-0 (2)	-0 (1)	-0 (2)	-0 (1)	-0 (2)	-0 (1)	-0 (2)	-0 (1)	-0 (2)	-0 (1)	-0 (2)
B302 TRSM6	-0 (1)	-0 (2)	-0 (1)	-0 (2)	-0 (1)	-0 (2)	-0 (1)	-0 (2)	-0 (1)	-0 (2)	-0 (1)	-0 (2)	-0 (1)	-0 (2)	-0 (1)	-0 (2)
B303 TRSM7	-0 (1)	-0 (2)	-0 (1)	-0 (2)	-0 (1)	-0 (2)	-0 (1)	-0 (2)	-0 (1)	-0 (2)	-0 (1)	-0 (2)	-0 (1)	-0 (2)	-0 (1)	-0 (2)
B304 TRSM6	2841 (8)	0597 (8)	-0475 (8)	-1282 (8)	0975 (8)	1375 (8)	-1632 (8)	2222 (8)	2727 (8)	2567 (8)	3750 (8)	3004 (8)				
B305 TRSM5	3668 (13)	-4319 (13)	-4149 (13)	-6181 (13)	-0100 (13)	-0705 (13)	-1230 (13)	-2038 (13)	1366 (13)	-1248 (13)	3044 (13)	3184 (13)				
B306 TRSM4	-1999 (26)	-2162 (26)	-0086 (26)	-2203 (26)	0759 (26)	0581 (26)	0655 (26)	0561 (26)	0468 (26)	1080 (26)	-0308 (26)	0439 (26)				
B307 TRSM3	-1990 (34)	-2070 (34)	-0473 (34)	-1836 (34)	-0512 (34)	0605 (34)	0346 (34)	-0360 (34)	-0387 (34)	-0165 (34)	-1015 (34)	-0797 (34)				
B308 TRSM2	-0986 (55)	-0089 (55)	0471 (55)	-0476 (55)	-0542 (55)	0472 (55)	0474 (55)	0369 (55)	-0035 (55)	0185 (55)	-0172 (55)	-0706 (55)				
B309 TRSM1	-1013 (61)	-0544 (61)	0285 (61)	-0077 (61)	-0391 (61)	1062 (61)	1408 (61)	0743 (61)	0177 (61)	-0301 (61)	-1034 (61)	-1149 (61)				
B310 TR50	-0080 (82)	-0172 (82)	0768 (82)	0357 (82)	0737 (82)	1789 (82)	-2892 (82)	2760 (82)	-2014 (82)	1649 (82)	-0236 (82)	0611 (82)				
B311 TR51	1162 (81)	-0849 (81)	1940 (81)	1219 (81)	1179 (81)	2443 (81)	3285 (81)	2897 (81)	1916 (81)	1781 (81)	-0524 (81)	1232 (81)				
B312 TR52	1474 (82)	1351 (82)	1973 (82)	1198 (82)	1399 (82)	2978 (82)	-3626 (82)	2773 (82)	2161 (82)	2189 (82)	-1212 (82)	1734 (82)				
B313 TR53	2300 (85)	-2030 (85)	2438 (85)	1838 (85)	2355 (85)	3205 (85)	3990 (85)	2995 (85)	2455 (85)	2707 (85)	-1669 (85)	2301 (85)				
B314 TR54	2002 (81)	1942 (81)	2476 (81)	1874 (81)	2105 (81)	3285 (81)	-3812 (81)	2711 (81)	-2058 (81)	2578 (81)	-1212 (81)	2114 (81)				
B315 TR55	2184 (83)	-2091 (83)	2766 (83)	1965 (83)	2490 (83)	3849 (83)	-4049 (83)	3151 (83)	2540 (83)	2966 (83)	-2031 (83)	2448 (83)				
B316 TR56	2934 (84)	2885 (84)	4194 (84)	3035 (84)	3455 (84)	4940 (84)	5375 (84)	4309 (84)	3785 (84)	4282 (84)	-2525 (84)	3345 (84)				
B317 TR57	3654 (84)	3337 (84)	5133 (84)	3949 (84)	2959 (84)	5394 (84)	-5875 (84)	5127 (84)	-4084 (84)	4827 (84)	-2476 (84)	3191 (84)				
B318 TR58	4028 (83)	-4098 (83)	5316 (83)	-4289 (83)	3717 (83)	-4972 (83)	-5681 (83)	5081 (83)	4402 (83)	5000 (83)	-2631 (83)	3792 (83)				
B319 TR59	4141 (84)	-4069 (84)	5482 (84)	-4399 (84)	3869 (84)	5051 (84)	-5974 (84)	5554 (84)	4573 (84)	5263 (84)	-3239 (84)	3946 (84)				
B320 TR510	4545 (78)	4417 (78)	5946 (78)	-4634 (78)	4116 (78)	5527 (78)	6079 (78)	5810 (78)	5156 (78)	5348 (78)	-3387 (78)	3753 (78)				
B321 TR511	4762 (67)	4332 (67)	6024 (67)	4884 (67)	4159 (67)	5669 (67)	5916 (67)	5344 (67)	4748 (67)	4690 (67)	-3463 (67)	3673 (67)				
B322 TR512	4205 (56)	3516 (56)	5096 (56)	4215 (56)	3463 (56)	5293 (56)	5172 (56)	4468 (56)	3689 (56)	4143 (56)	3916 (56)	3861 (56)				
B323 TR513	2616 (45)	1830 (45)	3825 (45)	2594 (45)	1358 (45)	3777 (45)	-4121 (45)	3468 (45)	4100 (45)	3051 (45)	2841 (45)	2449 (45)				
B324 TR514	4181 (27)	3566 (27)	5201 (27)	3631 (27)	2563 (27)	6159 (27)	6144 (27)	5616 (27)	6167 (27)	5063 (27)	5162 (27)	5138 (27)				
B325 TR515	0886 (22)	1609 (22)	2806 (22)	1889 (22)	3242 (22)	2801 (22)	3735 (22)	3866 (22)	4397 (22)	3139 (22)	0101 (22)	1043 (22)				
B326 TR516	127 (1)	128 (1)	129 (1)	130 (1)	131 (1)	132 (1)	133 (1)	134 (1)	135 (1)	136 (1)	137 (1)	138 (1)				
B327 TR517	139 (1)	140 (1)	141 (1)	142 (1)	143 (1)	144 (1)	145 (1)	146 (1)	147 (1)	148 (1)	149 (1)	150 (1)				
B328 TR518	151 (1)	152 (1)	153 (1)	154 (1)	155 (1)	156 (1)	157 (1)	158 (1)	159 (1)	160 (1)	161 (1)	162 (1)				
B329 TR519	163 (1)	164 (1)	165 (1)	166 (1)	167 (1)	168 (1)	169 (1)	170 (1)	171 (1)	172 (1)	173 (1)	174 (1)				
B330 TR520	175 (1)	176 (1)	177 (1)	178 (1)	179 (1)	180 (1)	181 (1)	182 (1)	183 (1)	184 (1)	185 (1)	186 (1)				
B331 TR521	187 (1)	188 (1)	189 (1)	190 (1)	191 (1)	192 (1)	193 (1)	194 (1)	195 (1)	196 (1)	197 (1)	198 (1)				
B332 TR522	199 (1)	200 (1)	201 (1)	202 (1)	203 (1)	204 (1)	205 (1)	206 (1)	207 (1)	208 (1)	209 (1)	210 (1)				
B333 TR523	211 (1)	212 (1)	213 (1)	214 (1)	215 (1)	216 (1)	217 (1)	218 (1)	219 (1)	220 (1)	221 (1)	222 (1)				
B334 TR524	223 (1)	224 (1)	225 (1)	226 (1)	227 (1)	228 (1)	229 (1)	230 (1)	231 (1)	232 (1)	233 (1)	234 (1)				
B335 TR525	235 (1)	236 (1)	237 (1)	238 (1)	239 (1)	240 (1)	241 (1)	242 (1)	243 (1)	244 (1)	245 (1)	246 (1)				
B336 TR526	247 (1)	248 (1)	249 (1)	250 (1)	251 (1)	252 (1)	253 (1)	254 (1)	255 (1)	256 (1)	257 (1)	258 (1)				
B337 TR527	259 (1)	260 (1)	261 (1)	262 (1)	263 (1)	264 (1)	265 (1)	266 (1)	267 (1)	268 (1)	269 (1)	270 (1)				
B338 TR528	271 (1)	272 (1)	273 (1)	274 (1)	275 (1)	276 (1)	277 (1)	278 (1)	279 (1)	280 (1)	281 (1)	282 (1)				
B339 TR529	283 (1)	284 (1)	285 (1)	286 (1)	287 (1)	288 (1)	289 (1)	290 (1)	291 (1)	292 (1)	293 (1)	294 (1)				
B340 TR530	295 (1)	296 (1)	297 (1)	298 (1)	299 (1)	300 (1)	301 (1)	302 (1)	303 (1)	304 (1)	305 (1)	306 (1)				
B341 TR531	307 (1)	308 (1)	309 (1)	310 (1)	311 (1)	312 (1)	313 (1)	314 (1)	315 (1)	316 (1)	317 (1)	318 (1)				
B342 TR532	319 (1)	320 (1)	321 (1)	322 (1)	323 (1)	324 (1)	325 (1)	326 (1)	327 (1)	328 (1)	329 (1)	330 (1)				
B343 TR533	331 (1)	332 (1)	333 (1)	334 (1)	335 (1)	336 (1)	337 (1)	338 (1)	339 (1)	340 (1)	341 (1)	342 (1)				
B344 TR534	343 (1)	344 (1)	345 (1)	346 (1)	347 (1)	348 (1)	349 (1)	350 (1)	351 (1)	352 (1)	353 (1)	354 (1)				
B345 TR535	355 (1)	356 (1)	357 (1)	358 (1)	359 (1)	360 (1)	361 (1)	362 (1)	363 (1)	364 (1)	365 (1)	366 (1)				
B346 TR536	367 (1)	368 (1)	369 (1)	370 (1)	371 (1)	372 (1)	373 (1)	374 (1)	375 (1)	376 (1)	377 (1)	378 (1)				
B347 TR537	379 (1)	380 (1)	381 (1)	382 (1)	383 (1)	384 (1)	385 (1)	386 (1)	387 (1)	388 (1)	389 (1)	390 (1)				
B348 TR538	391 (1)	392 (1)	393 (1)	394 (1)	395 (1)	396 (1)	397 (1)	398 (1)	399 (1)	400 (1)	401 (1)	402 (1)				
B349 TR539	403 (1)	404 (1)	405 (1)	406 (1)	407 (1)	408 (1)	409 (1)	410 (1)	411 (1)	412 (1)	413 (1)	414 (1)				
B350 TR540	415 (1)	416 (1)	417 (1)	418 (1)	419 (1)	420 (1)	421 (1)	422 (1)	423 (1)	424 (1)	425 (1)	426 (1)				
B351 TR541	427 (1)	428 (1)	429 (1)	430 (1)	431 (1)	432 (1)	433 (1)	434 (1)	435 (1)	436 (1)	437 (1)	438 (1)				
B352 TR542	439 (1)	440 (1)	441 (1)	442 (1)	443 (1)	444 (1)	445 (1)	446 (1)	447 (1)	448 (1)	449 (1)	450 (1)				
B353 TR543	451 (1)	452 (1)	453 (1)	454 (1)	455 (1)	456 (1)	457 (1)	458 (1)	459 (1)	460 (1)	461 (1)	462 (1)				
B354 TR544	463 (1)	464 (1)	465 (1)	466 (1)	467 (1)	468 (1)	469 (1)	470 (1)	471 (1)	472 (1)	473 (1)	474 (1)				
B355 TR545	475 (1)	476 (1)	477 (1)	478 (1)	479 (1)	480 (1)	481 (1)	482 (1)	483 (1)	484 (1)	485 (1)	486 (1)				
B356 TR546	487 (1)	488 (1)	489 (1)	490 (1)	491 (1)	492 (1)	493 (1)	494 (1)	495 (1)	496 (1)	497 (1)	498 (1)				
B357 TR547	499 (1)	500 (1)	501 (1)	502 (1)	503 (1)	504 (1)	505 (1)	506 (1)	507 (1)	508 (1)	509 (1)	510 (1)				
B358 TR548	511 (1)	512 (1)	513 (1)	514 (1)	515 (1)	516 (1)	517 (1)	518 (1)	519 (1)	520 (1)	521 (1)	522 (1)				
B359 TR549	523 (1)	524 (1)	525 (1)	526 (1)	527 (1)	528 (1)	529 (1)	530 (1)	531 (1)	532 (1)	533 (1)	534 (1)				
B360 TR550	535 (1)	536 (1)	537 (1)	538 (1)	539 (1)	540 (1)	541 (1)	542 (1)	543 (1)	544 (1)	545 (1)	546 (1)				
B361 TR551	547 (1)	548 (1)	549 (1)	550 (1)	551 (1)	552 (1)	553 (1)	554 (1)	555 (1)	556 (1)	557 (1)	558 (1)				
B362 TR552	559 (1)	560 (1)	561 (1)	562 (1)	563 (1)	564 (1)	565 (1)	566 (1)	567 (1)	568 (1)	569 (1)	570 (1)				
B363 TR553	571 (1)	572 (1)	573 (1)	574 (1)	575 (1)	576 (1)	577 (1)	578 (1)	579 (1)	580 (1)	581 (1)	582 (1)				
B364 TR554	583 (1)	584 (1)	585 (1)	586 (1)	587 (1)	588 (1)	589 (1)	590 (1)	591 (1)	592 (1)	593 (1)	594 (1)				
B365 TR555	595 (1)	596 (1)	597 (1)	598 (1)	599 (1)	600 (1)	601 (1)	602 (1)	603 (1)	604 (1)	605 (1)	606 (1)				
B366 TR556	607 (1)	608 (1)	609 (1)	610 (1)	611 (1)	612 (1)	613 (1)	614 (1)	615 (1)	616 (1)	617 (1)	618 (1)				
B367 TR557	619 (1)	620 (1)	621 (1)	622 (1)	623 (1)	624 (1)	625 (1)	626 (1)	627 (1)	628 (1)	629 (1)	630 (1)				
B368 TR558	631 (1)	632 (1)	633 (1)	634 (1)	635 (1)	636 (1)	637 (1)									

Table 4D (Continued)

8302 TRSM6	-0	(1)	-0	(1)	0	(1)	-0	(1)	-0	(1)	0	(1)	-0	(1)	-0	(1)
8303 TRSM7	-0	(2)	-0	(2)	-0	(2)	-0	(2)	-0	(2)	-0	(2)	-0	(2)	-0	(2)
8304 TRSM6	-5356	(8)	0623	(8)	1149	(8)	3801	(8)	5218	(8)	2307	(8)	0083	(8)	-3084	(8)
8305 TRSM5	-0754	(13)	-0651	(13)	-2273	(13)	3254	(13)	-4193	(13)	0949	(13)	-0296	(13)	-4573	(13)
8306 TRSM1	-0244	(26)	-1435	(26)	-0706	(26)	1434	(26)	-1185	(26)	1041	(26)	0265	(26)	-1940	(26)
8307 TRSM3	-0344	(34)	-0813	(34)	-1405	(34)	0095	(34)	-1956	(34)	0349	(34)	-0831	(34)	-2121	(34)
8308 TRSM2	0337	(55)	-0392	(55)	-0577	(55)	-0268	(55)	-0977	(55)	-0002	(55)	-0133	(55)	-1034	(55)
8309 TRSM1	-1442	(61)	-0661	(61)	-0285	(61)	-0866	(61)	-0525	(61)	-0096	(61)	-0461	(61)	-0230	(61)
8310 TRSO	-1937	(82)	-1267	(82)	-0545	(82)	-0235	(82)	-0651	(82)	-1578	(82)	-0889	(82)	0454	(82)
8311 TRS1	-2481	(81)	-2191	(81)	-1549	(81)	-0951	(81)	-0367	(81)	-2695	(81)	-1663	(81)	-1515	(81)
8312 TRS2	-1976	(82)	-2263	(82)	-1358	(82)	-1402	(82)	-0244	(82)	-2191	(82)	-1785	(82)	-1394	(82)
8313 TRS3	-1929	(85)	-2350	(85)	-1794	(85)	-1727	(85)	-1223	(85)	-3513	(85)	-2146	(85)	-1244	(85)
8314 TRS4	-1525	(81)	-2035	(81)	-1738	(81)	-1491	(81)	-1960	(81)	-2841	(81)	-2130	(81)	-1969	(81)
8315 TRS5	-1961	(83)	-2463	(83)	-2255	(83)	-2129	(83)	-0960	(83)	-2643	(83)	-2857	(83)	-2357	(83)
8316 TRS6	-3394	(84)	-4085	(84)	-3686	(84)	-3093	(84)	-0953	(84)	-3980	(84)	-4253	(84)	-3731	(84)
8317 TRS7	-4103	(84)	-5055	(84)	-4543	(84)	-2917	(84)	-0151	(84)	-4517	(84)	-4822	(84)	-4068	(84)
8318 TRS8	-4410	(83)	-5252	(83)	-4775	(83)	-3619	(83)	-0523	(83)	-4888	(83)	-5166	(83)	-4325	(83)
8319 TRS9	-4784	(84)	-5743	(84)	-4660	(84)	-4103	(84)	-0688	(84)	-4880	(84)	-5292	(84)	-4353	(84)
8320 TRS10	-5156	(78)	-5909	(78)	-4472	(78)	-4317	(78)	-0849	(78)	-5401	(78)	-5709	(78)	-4448	(78)
8321 TRS11	-4464	(67)	-5347	(67)	-4353	(67)	-4207	(67)	-0109	(67)	-6202	(67)	-5592	(67)	-4833	(67)
8322 TRS12	-3842	(56)	-4916	(56)	-3901	(56)	-3990	(56)	-0259	(56)	-5686	(56)	-5053	(56)	-4220	(56)
8323 TRS13	-2171	(45)	-3270	(45)	-2402	(45)	-2385	(45)	-0511	(45)	-3982	(45)	-3894	(45)	-3386	(45)
8324 TRS14	-5004	(21)	-6116	(21)	-4189	(21)	-5105	(21)	-2397	(21)	-5486	(21)	-5608	(21)	-4491	(21)
8325 TRS15	-2156	(22)	-1671	(22)	-1467	(22)	-1116	(22)	-0032	(22)	-2138	(22)	-2991	(22)	-3101	(22)
8326 TRS16	-140	(11)	-141	(11)	-142	(11)	-143	(11)	-144	(11)	-145	(11)	-146	(11)	-147	(11)
8327 TRS17	-148	(12)	-149	(12)	-150	(12)	-151	(12)	-152	(12)	-153	(12)	-154	(12)	-155	(12)
8328 TRS18	-156	(13)	-157	(13)	-158	(13)	-159	(13)	-160	(13)	-161	(13)	-162	(13)	-163	(13)
8329 TRS19	-164	(14)	-165	(14)	-166	(14)	-167	(14)	-168	(14)	-169	(14)	-170	(14)	-171	(14)
8330 TRS20	-172	(15)	-173	(15)	-174	(15)	-175	(15)	-176	(15)	-177	(15)	-178	(15)	-179	(15)
8331 TRS21	-180	(16)	-181	(16)	-182	(16)	-183	(16)	-184	(16)	-185	(16)	-186	(16)	-187	(16)
8332 TRS22	-188	(17)	-189	(17)	-190	(17)	-191	(17)	-192	(17)	-193	(17)	-194	(17)	-195	(17)
8333 TRS23	-196	(18)	-197	(18)	-198	(18)	-199	(18)	-200	(18)	-201	(18)	-202	(18)	-203	(18)
8334 TRS24	-204	(19)	-205	(19)	-206	(19)	-207	(19)	-208	(19)	-209	(19)	-210	(19)	-211	(19)
8335 TRS25	-212	(20)	-213	(20)	-214	(20)	-215	(20)	-216	(20)	-217	(20)	-218	(20)	-219	(20)
8336 TRS26	-220	(21)	-221	(21)	-222	(21)	-223	(21)	-224	(21)	-225	(21)	-226	(21)	-227	(21)
8337 TRS27	-228	(22)	-229	(22)	-230	(22)	-231	(22)	-232	(22)	-233	(22)	-234	(22)	-235	(22)
8338 TRS28	-236	(23)	-237	(23)	-238	(23)	-239	(23)	-240	(23)	-241	(23)	-242	(23)	-243	(23)
8339 TRS29	-244	(24)	-245	(24)	-246	(24)	-247	(24)	-248	(24)	-249	(24)	-250	(24)	-251	(24)
8340 TRS30	-252	(25)	-253	(25)	-254	(25)	-255	(25)	-256	(25)	-257	(25)	-258	(25)	-259	(25)
8341 TRS31	-260	(26)	-261	(26)	-262	(26)	-263	(26)	-264	(26)	-265	(26)	-266	(26)	-267	(26)
8342 TRS32	-268	(27)	-269	(27)	-270	(27)	-271	(27)	-272	(27)	-273	(27)	-274	(27)	-275	(27)
8343 TRS33	-276	(28)	-277	(28)	-278	(28)	-279	(28)	-280	(28)	-281	(28)	-282	(28)	-283	(28)
8344 TRS34	-284	(29)	-285	(29)	-286	(29)	-287	(29)	-288	(29)	-289	(29)	-290	(29)	-291	(29)
8345 TRS35	-292	(30)	-293	(30)	-294	(30)	-295	(30)	-296	(30)	-297	(30)	-298	(30)	-299	(30)
8346 TRS36	-300	(31)	-301	(31)	-302	(31)	-303	(31)	-304	(31)	-305	(31)	-306	(31)	-307	(31)
8347 TRS37	-308	(32)	-309	(32)	-310	(32)	-311	(32)	-312	(32)	-313	(32)	-314	(32)	-315	(32)
8348 TRS38	-316	(33)	-317	(33)	-318	(33)	-319	(33)	-320	(33)	-321	(33)	-322	(33)	-323	(33)
8349 TRS39	-324	(34)	-325	(34)	-326	(34)	-327	(34)	-328	(34)	-329	(34)	-330	(34)	-331	(34)
8350 TRS40	-332	(35)	-333	(35)	-334	(35)	-335	(35)	-336	(35)	-337	(35)	-338	(35)	-339	(35)
8351 TRS41	-340	(36)	-341	(36)	-342	(36)	-343	(36)	-344	(36)	-345	(36)	-346	(36)	-347	(36)
8352 TRS42	-348	(37)	-349	(37)	-350	(37)	-351	(37)	-352	(37)	-353	(37)	-354	(37)	-355	(37)
8353 TRS43	-356	(38)	-357	(38)	-358	(38)	-359	(38)	-360	(38)	-361	(38)	-362	(38)	-363	(38)
8354 TRS44	-364	(39)	-365	(39)	-366	(39)	-367	(39)	-368	(39)	-369	(39)	-370	(39)	-371	(39)
8355 TRS45	-372	(40)	-373	(40)	-374	(40)	-375	(40)	-376	(40)	-377	(40)	-378	(40)	-379	(40)
8356 TRS46	-380	(41)	-381	(41)	-382	(41)	-383	(41)	-384	(41)	-385	(41)	-386	(41)	-387	(41)
8357 TRS47	-388	(42)	-389	(42)	-390	(42)	-391	(42)	-392	(42)	-393	(42)	-394	(42)	-395	(42)
8358 TRS48	-396	(43)	-397	(43)	-398	(43)	-399	(43)	-400	(43)	-401	(43)	-402	(43)	-403	(43)
8359 TRS49	-404	(44)	-405	(44)	-406	(44)	-407	(44)	-408	(44)	-409	(44)	-410	(44)	-411	(44)
8360 TRS50	-412	(45)	-413	(45)	-414	(45)	-415	(45)	-416	(45)	-417	(45)	-418	(45)	-419	(45)
8361 TRS51	-420	(46)	-421	(46)	-422	(46)	-423	(46)	-424	(46)	-425	(46)	-426	(46)	-427	(46)
8362 TRS52	-428	(47)	-429	(47)	-430	(47)	-431	(47)	-432	(47)	-433	(47)	-434	(47)	-435	(47)
8363 TRS53	-436	(48)	-437	(48)	-438	(48)	-439	(48)	-440	(48)	-441	(48)	-442	(48)	-443	(48)
8364 TRS54	-444	(49)	-445	(49)	-446	(49)	-447	(49)	-448	(49)	-449	(49)	-450	(49)	-451	(49)
8365 TRS55	-452	(50)	-453	(50)	-454	(50)	-455	(50)	-456	(50)	-457	(50)	-458	(50)	-459	(50)
8366 TRS56	-460	(51)	-461	(51)	-462	(51)	-463	(51)	-464	(51)	-465	(51)	-466	(51)	-467	(51)
8367 TRS57	-468	(52)	-469	(52)	-470	(52)	-471	(52)	-472	(52)	-473	(52)	-474	(52)	-475	(52)
8368 TRS58	-476	(53)	-477	(53)	-478	(53)	-479	(53)	-480	(53)	-481	(53)	-482	(53)	-483	(53)
8369 TRS59	-484	(54)	-485	(54)	-486	(54)	-487	(54)	-488	(54)	-489	(54)	-490	(54)	-491	(54)
8370 TRS60	-492	(55)	-493	(55)	-494	(55)	-495	(55)	-496	(55)	-497	(55)	-498	(55)	-499	(55)
8371 TRS61	-500	(56)	-501	(56)	-502	(56)	-503	(56)	-504	(56)	-505	(56)	-506	(56)	-507	(56)
8372 TRS62	-508	(57)	-509	(57)	-510	(57)	-511	(57)	-512	(57)	-513	(57)	-514	(57)	-515	(57)
8373 TRS63	-516	(58)	-517	(58)	-518	(58)	-519	(58)	-520	(58)	-521	(58)	-522	(58)	-523	(58)
8374 TRS64	-524	(59)	-525	(59)	-526	(59)	-527	(59)	-528	(59)	-529	(59)	-530	(59)	-531	(59)
8375 TRS65	-532	(60)	-533	(60)	-534	(60)	-535	(60)	-536	(60)	-537	(60)	-538	(60)	-539	(60)
8376 TRS66	-540	(61)	-541	(61)	-542	(61)	-543	(61)	-544	(61)	-545	(61)	-546	(61)	-547	(61)
8377 TRS67	-548	(62)	-549	(62)	-550	(62)	-551	(62)	-552	(62)	-553	(62)	-554	(62)	-555	(62)
8378 TRS68	-556	(63)	-557	(63)	-558	(63)	-559	(63)	-560	(63)	-561	(63)	-562	(63)	-563	(63)
8379 TRS69	-564	(64)	-565	(64)	-566	(64)	-567	(64)	-568	(64)	-569	(64)	-570	(64)	-571	(64)
8380 TRS70	-572	(65)	-573	(65)	-574	(65)	-575	(65)	-576	(65)	-577	(65)	-578	(65)	-579	(65)
8381 TRS71	-580	(66)	-581	(66)	-582	(66)	-583	(66)	-584	(66)	-585	(66)	-586	(66)	-587	(66)
8382 TRS72	-588	(67)	-589	(67)	-590	(67)	-591	(67)	-592	(67)	-593	(67)	-594	(67)	-595	(67)
8383 TRS73	-596	(68)	-597	(68)	-598	(68)	-599	(68)	-600	(68)	-601	(68)	-602	(68)	-603	(68)
8384 TRS74	-604	(69)	-605	(69)	-606	(69)	-607	(69)	-608	(69)	-609	(69)	-610	(69)	-611	(69)
8385 TRS75	-612	(70)	-613	(70)	-614	(70)	-615	(70)	-616	(70)	-617	(70)	-618	(70)	-619	(70)
8386 TRS76	-620	(71)	-621	(71)	-622	(71)	-623	(71)	-624	(71)	-625	(71)	-626	(71)	-627	(71)
8387 TRS77	-628	(72)	-629	(72)	-630	(72)	-631	(72)	-632	(72)	-633	(72)	-634	(72)	-635	(72)
8388 TRS78	-636	(73)	-637	(73)	-638	(73)	-639	(73)	-640	(73)	-641	(73)	-642	(73)	-643	(73)
8389 TRS79	-644	(74)	-645	(74)	-646	(74)	-647	(74)	-648	(74)	-649	(74)	-650	(74)	-	

Table 4E

[illegible]



Table 4E (Continued)

### COMBINING PREDICTORS

Sorting out the complexity involved in summarizing the hundreds of bivariate correlations between the HRMS measures and the numerous performance measures reported in the previous section requires some strategy for data reduction and simplification. This section outlines the rationale for reducing the number of predictors, and then presents the multiple regression equations, using a limited number of predictors, along with discussion of their predictive power and associated lag times.

#### Reducing the Number of Predictor Variables

The HRMS indexes, as noted in the interim report, are highly intercorrelated in both Wave 1 and Wave 2. More importantly, the intercorrelations within domains (such as, command climate, supervisory leadership or peer leadership) are higher than those between indexes in different domains. This suggests the data reduction strategy of creating domain indexes to use as predictors in the multiple regression equations.

An examination of the intercorrelation matrix for Wave 1 (see Table 5) data shows that by using a simple single-linkage criterion of .90<sup>1</sup>, domain indexes for the command climate, supervisory leadership and peer leadership emerge. Combining these domain indexes with the other single indexes

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<sup>1</sup> A single linkage criterion of .90 means that all items that correlate .90 or greater with another item in a cluster are added to that cluster.

## NHRMS Wave 1 Index Interrelations

[illegible]

that have strong predictive relationships to the performance measures leaves a more limited set of nine predictors used to generate the HRA prediction equations. This set of predictors includes:

- 160 Command Climate
- 161 Supervisory Leadership
- 162 Peer Leadership
- 131 Fair and Equitable Treatment
- 145 Workgroup Discipline
- 146 Satisfaction
- 147 Lower Level Influence
- 148 Training
- 149 Equal Opportunity

Applying the .90 single linkage criterion to Wave 2 index intercorrelations also yields similar results. The selection of a criterion level this high insures that very little of the unique explanatory power of each index is lost and at the same time greatly reduces the number of predictors to be used in the HRA equations.

#### The Multiple Regression Equations

This reduced set of HRMS indexes were then used to predict each of the performance outcomes for all relativized time periods concurrent with, or subsequent to Wave 1 HRMS data. Thus, for all performance measures:

$$P_i = C + B_1(HRMS_1) + B_2(HRMS_2) \dots B_9(HRMS_9) + R$$

where,

$P_i$  = standardized and relativized performance measures for  $T_i$ , and  $i$  varies from  $T_0 \dots T_n$  for all performance periods following Wave 1,

$C$  = the constant term in the unstandardized regression equation,

$B_1 \dots B_9$  = the regression weights associated with  $HRMS_1 \dots HRMS_9$ , the nine HRMS indexes used as predictors in this analysis, and

$R$  = the residual term--the variance in a particular performance measure that is unexplained by the set of predictors.

This analysis generated a set of constants and weights to be used in the prediction of future performance that are presented in Appendix B. The Multiple R graph of the predictive power and its variation over time for each of the performance outcomes are presented and summarized in the following section.

## PREDICTING PERFORMANCE OUTCOMES

### Predicting First-Term and Total-Term Reenlistment Rates

Figure 1 presents the multiple regression coefficient for both first-term and total-term reenlistment, plotted as a function of time. This graph shows some evidence of the two-humped pattern noted in previous studies, primarily for the first-term data. The most remarkable aspect of this graph, however, is the overall high level of the Multiple R, and the fact that ability to predict increases as a function of time. The HRMS indexes are solid predictors of concurrent performance (.50) but are an excellent predictor of reenlistment rates two to three years in the future. It is also noteworthy that the Multiple R in  $T_{+9}$  has not yet begun to decline. This suggests that the management of a ship's command has an extremely strong impact on reenlistment rates that may extend more than three years into the future.

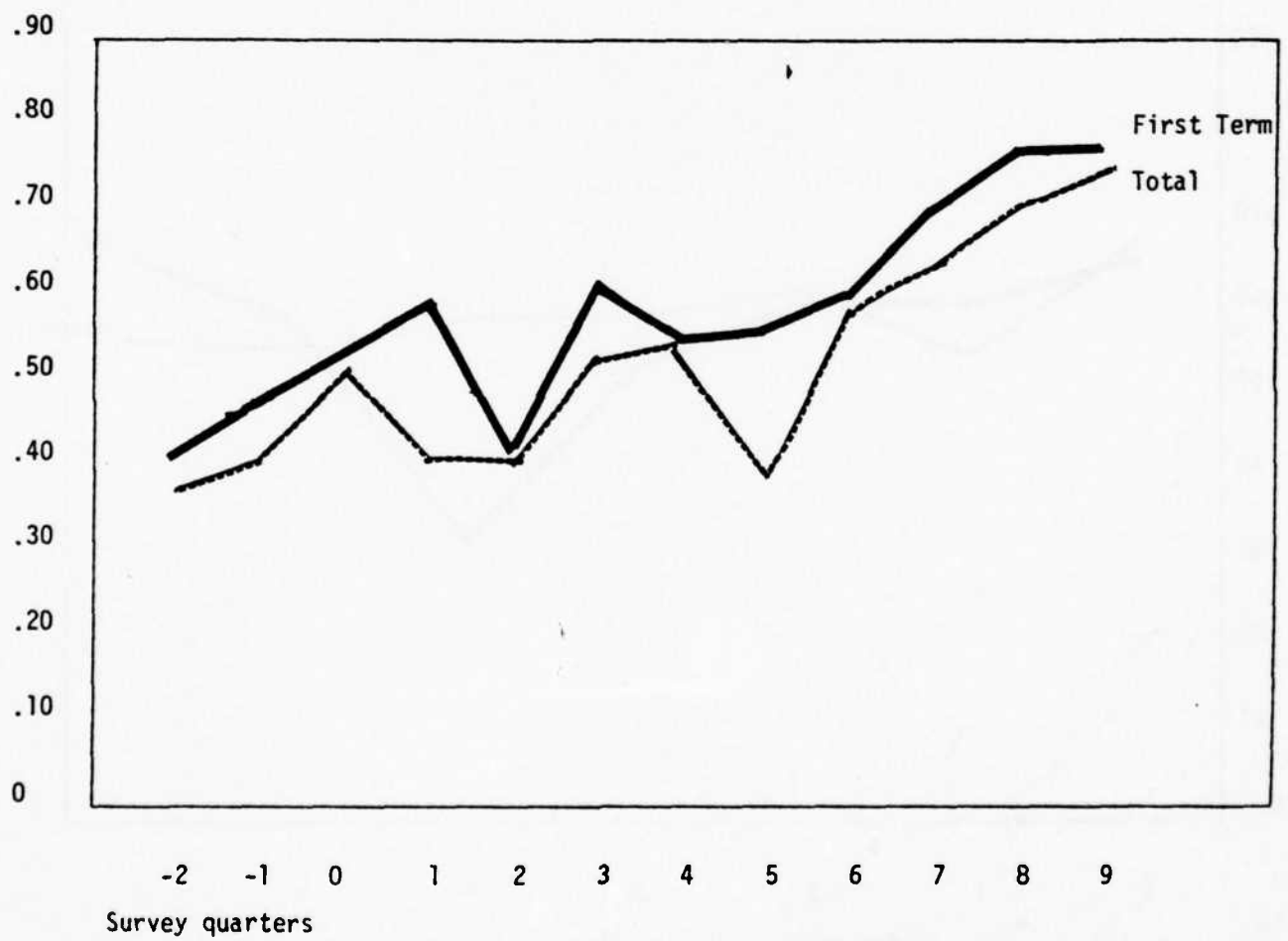
### Predicting Unauthorized Absence and Desertion Rates

Figure 2 presents the HRMS Multiple R for UA and Desertion as a function of time. HRMS indexes are also very good predictors of UA and Desertion rates at  $T_0$ , and generally decline or remain stable for the two years after that. The HRMS-UA relationship increases in periods 5 and 6 and is in fact stronger in  $T_6$  than at any other time. The

Figure 1

First Term and Total Reenlistment by Time Period \*  
Multiple Regression with HRMS Indexes as Predictors

Multiple R

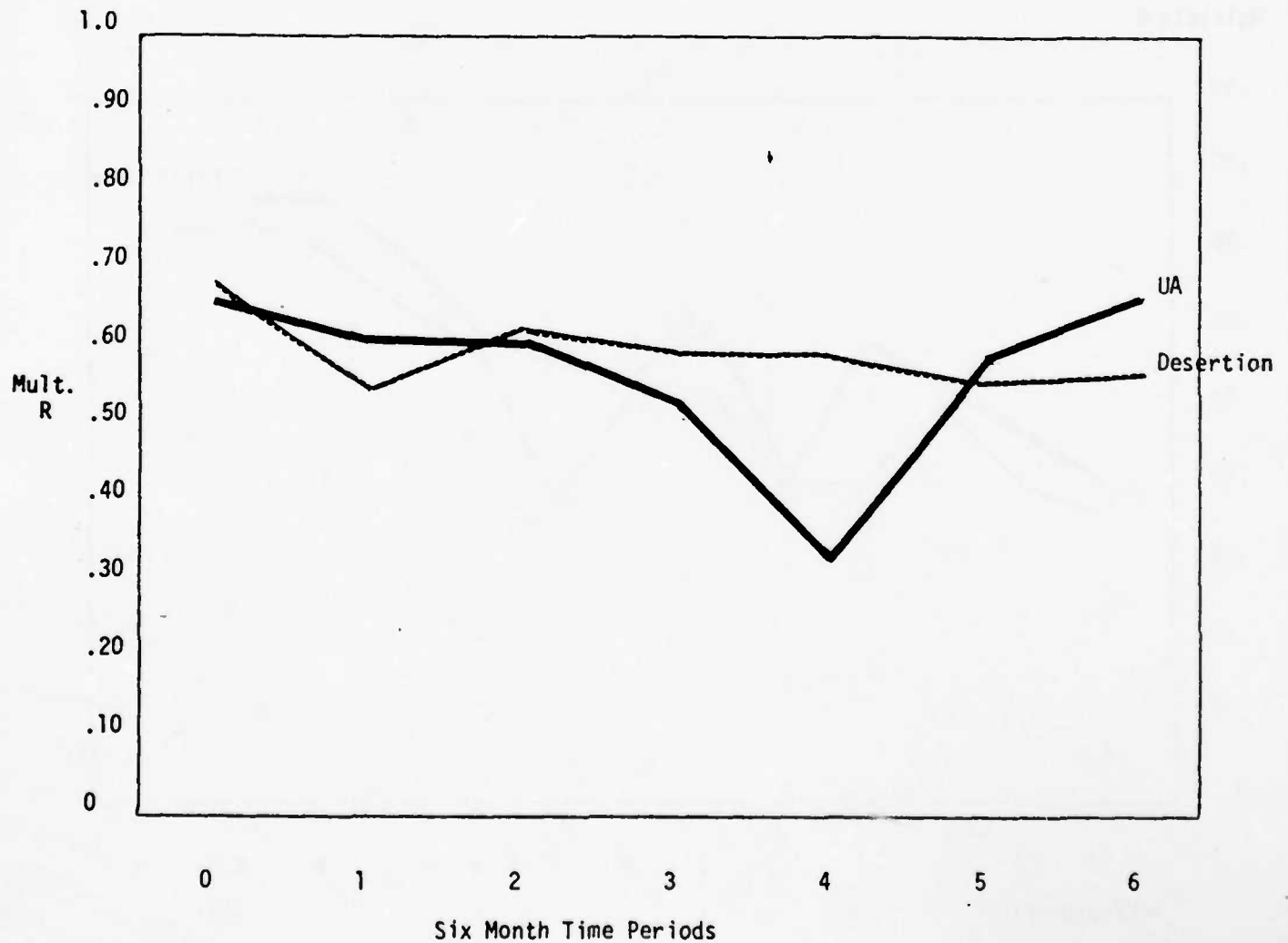


— First term  
- - Total

\* Each time period represents three months, e. g.,  $T_1$  represents the period approximately three months after the survey date.

Figure 2

UA and Desertion by Time Period \*  
Multiple Regression with HRMS Indexes as Predictors



\*Each time period represents six months, e.g.,  $T_1$  represents the period approximately six months after the survey date.

— UA Mult. R  
..... Desertion Mult. R



HRMS-Desertion relationship shows little of that two-humped pattern, but rather remains fairly constant (.60) over the three year time span for which data were available.

#### Predicting Non-Judicial Punishment and Drug and Marijuana Offenses

The relationship over time between the HRMS predictors and both NJP rates and Drug and marijuana offense rates are presented in Figure 3. Both of these relationships are strong at  $T_0$  and then fluctuate between .50 and .70 over the next 12 to 15 performance periods. Notably, the relationship for both measures rises for the 16th performance period, with the HRMS-Drug and marijuana relationship reaching its peak. This graph demonstrates once again the general strength of the impact of the management system on performance outcomes, and its remarkable persistence. One can, in effect, use survey data to predict at some point in the future which ships will have the highest offense rates, even though those offenders have not yet entered the service.

#### Predicting the Readiness of the Fleet (FORSTAT)

The final Multiple R graph, and clearly the most remarkable, presents the relationship between the HRMS predictors and Readiness (FORSTAT) over time. The findings are presented in Figure 4.

Figure 3

Relationship of NHRMS Indexes to Non-Judicial Punishment  
And Drug & Marijuana Offense Rates

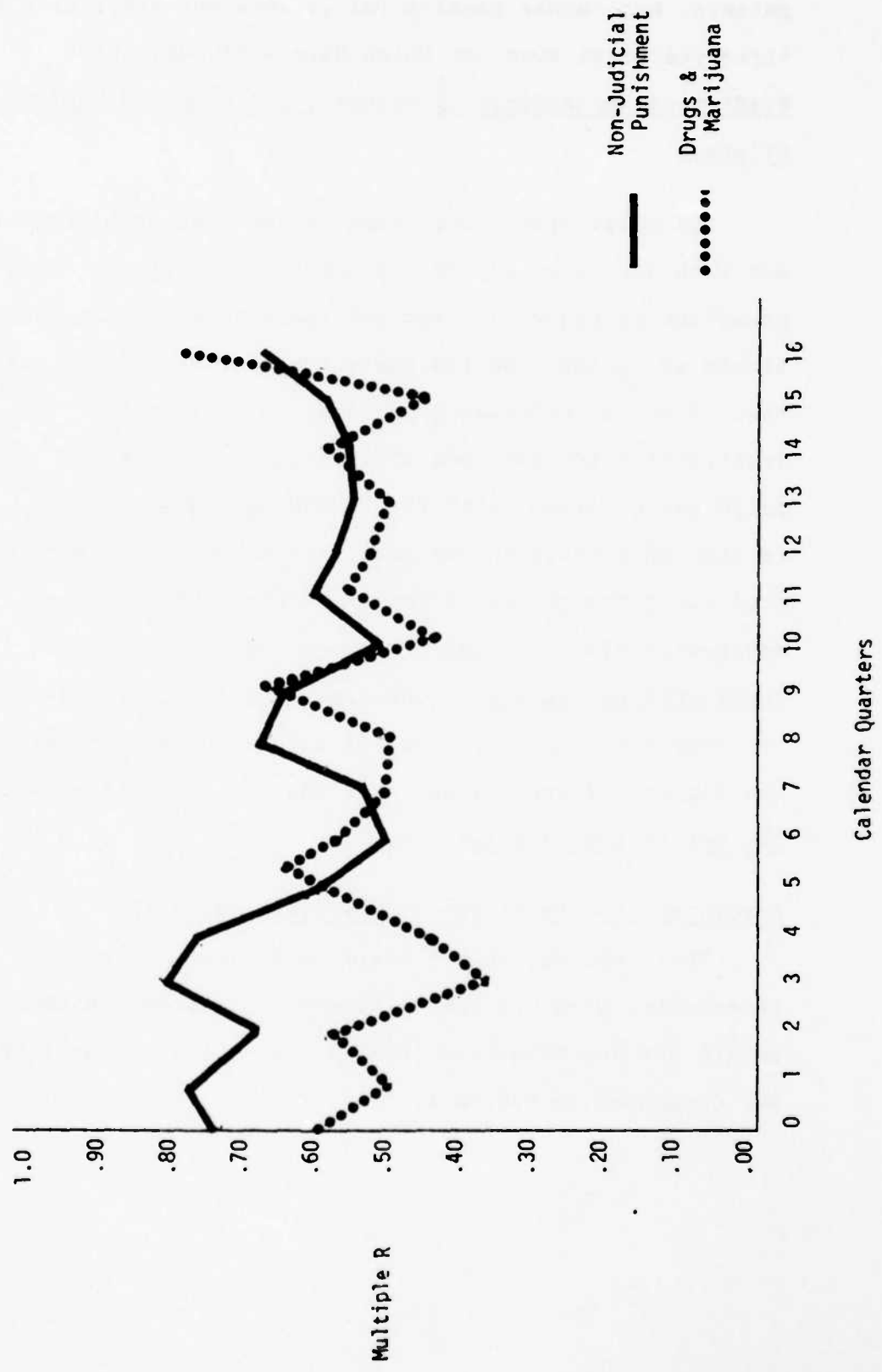
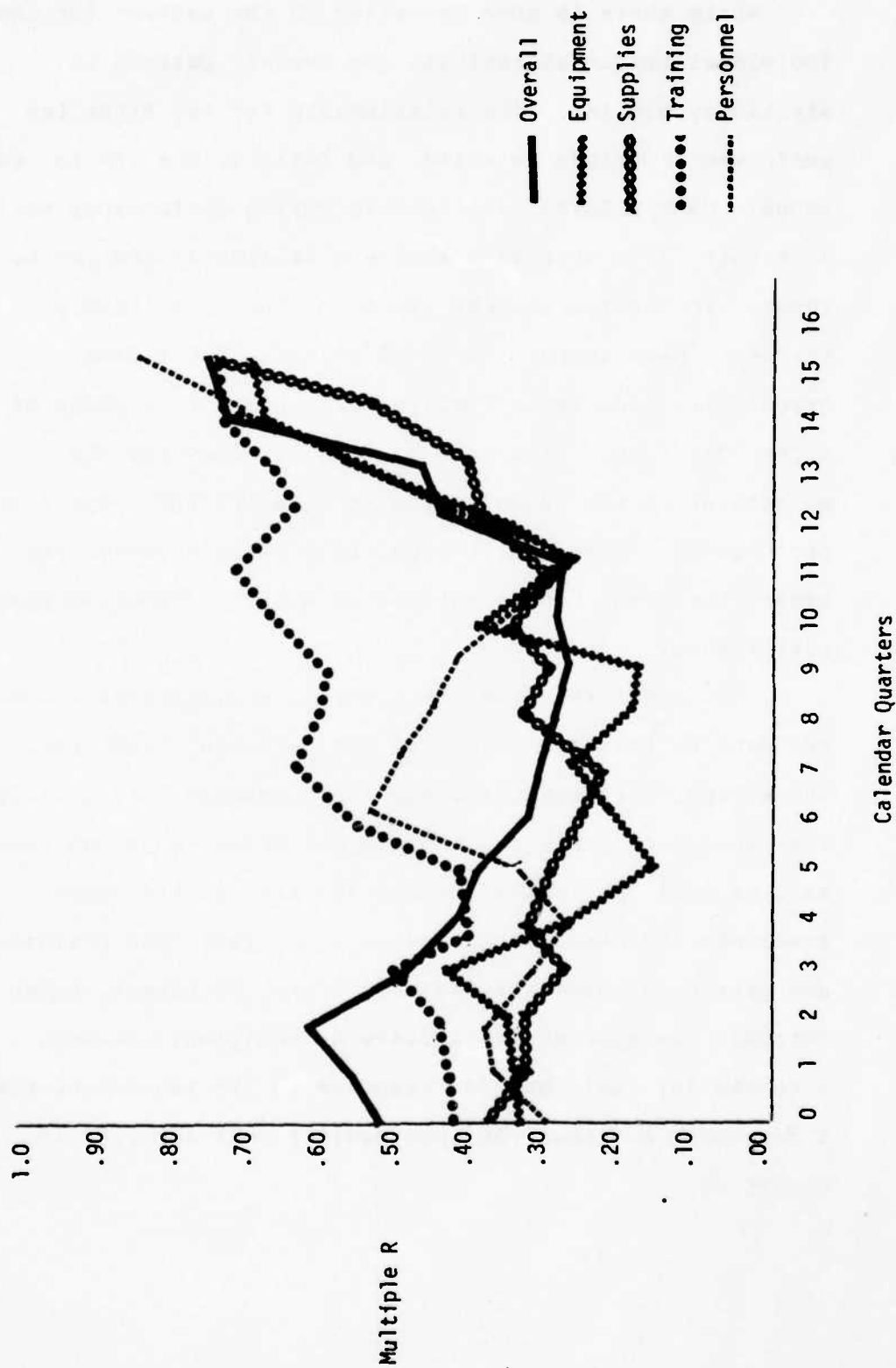


Figure 4

Readiness (FORSTAT)



While there is some variation in the pattern for the individual readiness ratings, the overall pattern is strikingly similar. The relationship for the first few performance periods is solid, and falls in the .30 to .60 range. HRMS-FORSTAT relationship during performance periods 3 through 11 is generally smaller, falling in the .20 to .40 range. In the fourth year, however, the relationship reaches a peak in the .70 to .80 range. These data graphically underscore the long-term predictive power of the survey data, and the length of time it takes for the management of the human system to show its full impact on performance. They also follow, in a classic sense, the basic "two-hump" concurrent and predictive impact on system performance.

Two departures from the above generalizations concern the data on training readiness and personnel readiness. These aspects of readiness appear to respond more quickly to the management practices and systems aboard ship and show an earlier peak (periods 6 through 10) than do the other readiness indicators. Apparently, the fact that training and personnel readiness indicators are, in effect, human outcomes (as opposed to hardware or equipment) perhaps accounts for their quicker response to the management system indicators, and thus the intermediate peak apparent in Figure 4.

This set of graphs makes an important point. The relationship between the management system of an organization and its performance is a very strong one, but it is also one that takes a substantial amount of time to show its full impact. The value associated with a high state of readiness, a high reenlistment rate, or a low incidence of UAs, NJPs, etc. at some time in the future, should be attributed to the character of the management system at the present. Current value HRA is the means by which that connection is made.

VALUE ATTRIBUTIONPredicting Future Performance Scores

Combining the prediction equations described above with the Wave 2 HRMS data allows for an estimation of the expected performance outcomes for the performance periods following Wave 2. This requires the assumption that the relationship between the management system, as measured by the HRMS indexes, and the performance outcomes remains the same. Future research may focus on this issue, but at this point such an assumption is reasonable.

Thus, for each  $P_i$  there is a  $P_i'$  such that:

$$P_i' = C + B_1(\text{HRMSW2}_1) + B_2(\text{HRMSW2}_2) \dots B_9(\text{HRMSW2}_9)$$

where,

$P_i'$  = the predicted performance score for performance periods  $T_i'$ , where  $i$  varies from  $T_0 \dots T_n$  for all performance periods following Wave 2, and

$C$  = the constant term in the unstandardized regression equation(s) describing the relationship between Wave 1 HRMS data and performance, and

$B_1 \dots B_9$  = the regression weights derived from the Wave 1 prediction equations, and

$\text{HRMSW2}_1 \dots \text{HRMSW2}_9$  = the Wave 2 values for the set of predictors used in the Wave 1 prediction equations.

Following this general procedure for all ten performance measures for all available time periods generates a set of expected performance scores for performance periods subsequent to Wave 2.

#### Conversion to Change in the Original Metric

Before change in performance can be accurately attributed to change in human resource practices two more steps must be completed. First, performance change scores must be created by subtracting  $P_i$  from  $P_i'$  for each period and for each performance measure. Second, those change scores must then be converted back to the original metric from which they were derived. As described above, the original  $P_i$  were standardized with respect to the entire sample and then relativized with respect to Wave 1 survey date. The prediction equations are derived from these standardized scores, and thus the  $P_i'$  and the resulting  $P_i$  reflect the original standardization. Unstandardization, or conversion back to the original metric requires that

$$\Delta P_i(\text{UNSTD}) = \Delta P_i(\text{STD}) \cdot SD_{P_i}$$

where

$\Delta P_i(\text{UNSTD})$  = performance change scores reflected in the original metric (i.e., UA rates, FORSTAT rating scales, etc.), and

$\Delta P_i(\text{STD})$  = the performance change scores in a standardized metric, and

$SD_{pi}$  = the standard deviation of the original relativized performance scores for performance periods  $T_0 \dots T_n$ .

Following this procedure generated predicted change scores in the original metric for all ten performance measures throughout all performance periods for which data were available.

#### Comparing HRMS Change and Performance Change

The strategy used to compare HRMS change and performance change in this project involves summarizing the predicted performance changes for each of the categories in the HRMS change typology presented in the interim report (Bowers, 1983). Summarizing performance changes in this way gives a clear picture of the performance improvements or deterioration expected for those units that improve or deteriorate on the HRMS dimensions. This section reviews the HRMS change typology and then presents the projected performance increments associated with those units that are classified as gainers or losers according to that typology. After an assessment of the reliability of the projected increments and decrements, a series of projections are made regarding the expected performance gains and losses.

#### The HRMS Change Typology

Analyzing Wave 1 - Wave 2 gain scores for HRMS indexes revealed that their range was quite wide--from an overall improvement of nearly three-quarters of a scale point to an



overall deterioration of approximately the same magnitude. On the average, however, the gain scores were very small, indicating a slight overall improvement for the fleet, but a set of improvements and deteriorations that generally averaged out.

Case-wise clustering of the Wave 1 - Wave 2 gain scores produced seven distinct change "types," five of which had a sufficient number of cases to yield a useful change typology. Those types were:

Type 1 - Modest improvement: up to approximately 1/4 standard deviation improvement (41% of all units).

Type 2 - Modest deterioration: up to approximately 1/4 standard deviation deterioration (16% of all units).

Type 3 - Mixed effects: up to approximately 1/4 standard deviation deterioration in command climate, but up to approximately 1/4 standard deviation improvement in supervisory leadership and work group relations (13% of all units).

Type 5 - Substantial improvement: up to approximately one standard deviation improvement (14% of all units).

Type 6 - Substantial deterioration: up to approximately one standard deviation deterioration (14% of all units).

Combining Type 1 with Type 5 and Type 2 with Type 6 results in a two-category typology--the "gainers"--units that showed improvements in their HRMS scores, and "losers"-- units that showed deterioration in their HRMS

scores. Of the 139 Navy units for which gain scores were available, 57% were classified as gainers, while 30% were classified as losers.

#### The Projected Performance Increments

This typology provides a framework for estimating the performance gains and losses associated with changes in the management of the human organization. Table 6 presents the projected performance increments and decrements summarized by year, expressed in the original metric of each of the performance measures. Also presented in this table are the levels of significance for the difference in the projected increment for gainers and losers, and the number of cases on which these estimates were made.

Evaluating the reliability of each of these increments is necessary before they can be used to make an actual projection. Should a projection be made if only a few cases are available?...If the increment is directionally inappropriate (i.e., large HRMS gains mean decreased readiness)?...If the cases used to compute the increment are not representative of the total sample? All of these questions imply that some estimate of the reliability of each increment must be carried out before actual projections are made.

The procedure used in this study to evaluate the reliability of projected performance increments relied upon the following three criteria.

Table 6  
Projected Performance Increments

Performance Variables	Gainers	Losers	Probability	N
<u>Reenlistment</u>				
Year 1	.034	-.044	.02	99
Year 2	.024	-.028	.21	68
<u>Unauthorized Absence</u>				
Year 1	-.001	.006	.17	115
Year 2	-.004	.007	.02	112
Year 3	.049	.048	.89	63
<u>Desertion</u>				
Year 1	-.0004	.001	.32	115
Year 2	-.001	.002	.07	112
Year 3	.0002	-.0008	.48	63
<u>Non-Judicial Punishment</u>				
Year 1	-.005	-.001	.61	51
Year 2	-.002	-.014	.26	69
Year 3	-.005	-.010	.72	70
Year 4	.003	-.02	.10	35
<u>Drug and Marijuana Offenses</u>				
Year 1	.000	-.002	.38	51
Year 2	.001	-.001	.44	69
Year 3	.019	.022	.56	70
Year 4	.000	-.000	.72	35
<u>Overall Readiness</u>				
Year 1	-.019	-.167	.30	73
Year 2	.179	-.150	.04	72
Year 3	-.003	-.125	.41	67
Year 4	.114	-.298	.40	20
<u>Equipment Readiness</u>				
Year 1	-.094	.045	.27	72
Year 2	-.038	-.145	.53	72
Year 3	-.075	.089	.27	67
Year 4	-.239	-.205	.94	19
<u>Supply Readiness</u>				
Year 1	.077	-.247	.03	72
Year 2	.030	-.09	.48	72
Year 3	-.008	.002	.66	67
Year 4	-.33	.61	.00	19
<u>Training Readiness</u>				
Year 1	.160	-.25	.04	72
Year 2	.306	-.092	.03	72
Year 3	.284	-.093	.10	67
Year 4	.314	-.445	.20	19
<u>Personnel Readiness</u>				
Year 1	.022	-.062	.59	75
Year 2	.083	-.041	.52	75
Year 3	.000	.010	.96	68
Year 4	-.018	.318	.51	22

1. The Direction of the Relationship. Is the direction of the increment in keeping with the correlation and regression findings reported earlier? If so, this was taken as evidence of reliability.

2. The Representativeness of the Sub-Sample. Each projected increment was estimated from a sub-sample of cases for which two waves of HRMS data and performance data were available. What if the HRMS scores for the sub-sample that had performance data were not representative of the HRMS scores for the total sample of gainers or losers? If the HRMS scores were not representative, this was taken as evidence of unreliability. To test for representativeness, t-tests were performed comparing HRMS scores for those cases used to estimate the performance increments with those cases where missing performance data precluded their being used to estimate the increments. Those increments for which the cases used to estimate the increment were significantly different with respect to HRMS scores from those cases not used because of missing performance data were judged to be less representative. Those increments for which three or more of the nine HRMS predictors were significantly different were judged to be unrepresentative.

3. The Probability of the Difference Between Gainers and Losers. Instances where the difference between gainers and losers is very small, or where the number of cases used to make a projection was very small, also appear to be less reliable means for making a projection. While a traditional

interpretation of statistical significance is not appropriate for this analysis, a rough level of  $p \leq .25$  was selected as the third screening criteria for reliability.

Table 7 presents a summary of the general reliability of each of the estimated increments. Those yearly performance measures for which two of the three reliability criteria were met were chosen for the actual projections. These measures are noted in Table 7 with an asterisk. No projection was made for NJP, however, because only one of the four years appeared to be reliable.

Table 7

## Reliability of Performance Increments

Measure	Direction	Representativeness	Probability
<u>Reenlistment</u>			
Year 1*	+	-	+
Year 2*	+	+	+
<u>Unauthorized Absence</u>			
Year 1*	+	+	+
Year 2*	+	+	+
Year 3	-	+	-
<u>Desertion</u>			
Year 1*	+	+	-
Year 2*	+	+	+
Year 3	-	+	-
<u>Non-Judicial Punishment</u>			
Year 1	-	+	-
Year 2	-	+	-
Year 3	-	+	-
Year 4*	-	+	+
<u>Drug and Marijuana Offenses</u>			
Year 1	-	+	-
Year 2	-	+	-
Year 3	-	+	-
Year 4	-	+	-
<u>Overall Readiness</u>			
Year 1	-	+	-
Year 2*	+	+	+
Year 3	-	+	-
Year 4*	+	+	-
<u>Equipment Readiness</u>			
Year 1	-	+	-
Year 2	-	+	-
Year 3	-	+	-
Year 4	-	-	-
<u>Supply Readiness</u>			
Year 1*	+	+	+
Year 2*	+	+	-
Year 3	-	+	-
Year 4	-	-	+
<u>Training Readiness</u>			
Year 1*	+	+	+
Year 2*	+	+	+
Year 3*	+	+	+
Year 4*	+	+	+
<u>Personnel Readiness</u>			
Year 1*	+	+	-
Year 2*	+	+	-
Year 3	-	+	-
Year 4	-	-	-

\*denotes those performance measures that meet at least two of the three reliability criteria.

### DIFFERENCES BETWEEN GAINERS AND LOSERS

Using the set of increments judged to be reliable, a set of expected gains & losses in manpower and readiness can be estimated. The difference between being a "gainer" in the change typology and a "loser" can be expressed in familiar terms--changes in the relevant performance outcomes.

#### Projected Manpower Gains and Losses

Three of the performance outcomes can be readily expressed in terms of numbers of people who reenlist, go UA or desert. The expected number is based on the size of the increment or decrement, the proportion of gainers and losers, and the size of the population to which the projections are made. The first example, presented below in Table 8, projects the expected gains and losses to the project sample of 174 units.

This table shows that a substantial change in each of these performance criteria can be attributed to the change type. The gainers, for example, would have over 1600 men over a two year period that would not have to be replaced because of non-reenlistment, unauthorized absence or desertion. The losers, in contrast, would require that roughly 1150 men would need to be replaced.

If it is assumed that the basic relationship uncovered within the project sample holds true throughout the fleet, a much larger projection can be made. By knowing the projected increments, the proportion of gainers and losers,

Table 8

Manpower Gains and Losses  
Associated with HPMS Change Type  
Project Sample\*

Criteria	Gainers (57%)		Losers (30%)	
	Yearly Gain	Two Year Gain	Yearly Loss	Two Year Loss
<u>Reenlistment</u>				
Year 1	+866		-590	
Year 2	+611	+1477	-375	-965
<u>Unauthorized Absence</u>				
Year 1	-26		+80	
Year 2	-102	-128	+94	+174
<u>Desertion</u>				
Year 1	-11		+14	
Year 2	-26	-37	+26	+40

\*The sample used for this project has a total of 44,662 personnel in the E1 - E2 range. The projections made for the gainers and losers are based on the proportion of units that were in each of those categories.



and the total number of personnel in the fleet (the E1 - E7 complement) the projections presented in Table 9 can be made.

These projections imply that substantial manpower gains are associated with improving the management system within Navy units. Gainers as a group appear to have over 17,000 additional men available for duty, when viewed over a two year period. Losers in contrast, must do without more than 12,000.

The final projection makes the brash assumption that the entire Navy could be "gainers" or "losers". If the expected performance increment is projected to the entire Navy E1 - E7 group, the apparent performance gains appear even larger. These gains and losses are presented in Table 10.

Table 10 implies that a shift in the Navy's human resource management practices that led all units to be classified as "gainers" would result in an additional 30,000 men available for duty over a two year period. This substantial chunk of manpower is roughly comparable to the 40,000 men likely to be unavailable for duty should the entire Navy become HRMS "losers". Most importantly, the difference, in the aggregate, between being gainers rather than losers appears to be worth about 30-35,000 men per year.

Table 9

Manpower Gains and Losses  
Associated with HRMS Change Type  
Total Fleet\*

Criteria	<u>Gainers (57%)</u>		<u>Losers (30%)</u>	
	Yearly Gain	Two Year Gain	Yearly Loss	Two Year Loss
<u>Reenlistment</u>				
Year 1	+9266		6314	
Year 2	+6536	+15802	-4012	-10326
<u>Unauthorized Absence</u>				
Year 1	-276		+856	
Year 2	-1090	-1366	+1004	+1860
<u>Desertion</u>				
Year 1	-117		+148	
Year 2	-276	-393	+281	+429

\*The fleet has a total of 477,972 personnel in the E1 - E7 ranks. The projections made for the gainers and losers are based on the proportion of units that were in each of those categories.

Table 10

Manpower Gains and Losses  
Associated with HRMS Change Type  
Total Fleet\*

Criteria	Gainers		Losers	
	Yearly Gain	Two Year Gain	Yearly Loss	Two Year Loss
<u>Reenlistment</u>				
Year 1	+16257		-21046	
Year 2	+11467	+27724	-13375	-34421
<u>Unauthorized Absence</u>				
Year 1	-483		+2854	
Year 2	-1912	-2395	+3346	+6200
<u>Desertion</u>				
Year 1	-205		+492	
Year 2	-483	-688	+938	+1430

\*The fleet has a total of 477,972 personnel in the E1 - E7 ranks. These projections are based on the premise that all units in the fleet were "gainers;" or, alternatively, that all units were "losers" rather than projecting only to that proportion of the project sample that were gainers or losers.

Converting these projected performance outcomes to a common dollar metric would give a cost estimate of the manpower implications of these gains and losses. In this research effort this step has not been taken. With that information, the gains and losses associated with changes in the human system could be directly converted into a common dollar metric--the end point of the value attribution process.

Projected Gains and Losses in Readiness.

Projecting gains and losses in readiness to the fleet requires a slightly different strategy than did projecting manpower gains and losses. The readiness metric in itself has less meaning than does a manpower count, and thus it is most useful to express the readiness gains in terms of progress relative to the fleet. Thus, the presentation of the projected gains and losses in readiness will be expressed as the percentage of the fleet that a unit would "surpass" if it were a "gainer", or its relative loss in relation to the fleet if it were a "loser".

This strategy first requires some information about the distribution of the Readiness ratings at time periods following Wave 1, for those performance outcomes for which projections will be made. Table 11 presents decile values for these FORSTAT ratings, and thus provides the basis for an estimate of change relative to the fleet in percentile terms.

Table 11  
Decile Value from Actual FORSTAT Ratings

Performance Outcomes																
Deciles	Overall		Supply		Training		Training		Training		Training		Personnel		Personnel	
	Readiness	Year 2	Readiness	Year 1	Readiness	Year 2	Readiness	Year 1	Readiness	Year 2	Readiness	Year 3	Readiness	Year 4	Readiness	Year 2
.10	2.18	1.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.51
.20	2.36	2.24	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.96
.30	2.53	2.46	1.18	1.03	1.28	1.34	1.28	1.25	1.25	1.00	1.00	1.25	1.00	1.00	1.67	2.03
.40	2.79	2.54	1.32	1.21	1.47	1.57	1.47	1.70	1.70	1.18	1.18	1.70	1.18	1.18	2.00	2.16
.50	3.00	2.66	1.51	1.34	1.81	1.98	1.81	1.93	1.93	1.64	1.64	1.93	1.64	1.64	2.02	2.45
.60	3.13	3.00	1.74	1.62	2.00	2.08	2.00	2.03	2.03	2.28	2.28	2.03	2.28	2.28	2.24	2.77
.70	3.27	3.00	1.91	1.85	2.34	2.54	2.34	2.61	2.61	3.00	3.00	2.61	3.00	3.00	2.48	3.00
.80	3.54	3.51	2.00	2.06	2.71	3.00	2.71	3.00	3.00	3.26	3.26	3.00	3.26	3.26	2.80	3.25
.90	3.88	3.72	2.20	2.57	3.02	3.50	3.02	3.27	3.27	3.50	3.50	3.27	3.50	3.50	3.00	3.54
N	87	27	89	89	89	89	89	81	81	26	26	81	92	92	92	92

An accurate estimate of movement in percentile terms also requires an actual starting point. For these analyses the starting point for the gainers was the mean value for the gainers on each of the observed FORSTAT ratings, while the starting point for the losers was their mean value on the observed FORSTAT ratings. Starting points for gainers and losers are listed in Appendix A.

Using the distributions and the starting points, the percentage gains and losses relative to the fleet presented in Table 12 would be predicted.

These changes imply that a ship that was a gainer, for example, and was at the 50th percentile in Readiness at the time of Wave 1 survey data collection, would, after four years, surpass an additional 13% of the fleet in Overall readiness and be at the 63% percentile. A ship that was a loser, in contrast would drop 24 percentile points and change, for example, from the 50th percentile to the 26th percentile.

These projections all show substantial gains and losses in readiness associated with changes in the management of the human system in Navy units for those time periods where reliable projections have been made. Training readiness, in particular, shows a remarkable gain of 34% associated with positive HRMS change. These projections provide further evidence of the value that can be attributed to HRMS change.

Table 12  
Readiness Gains and Losses Relative to the Fleet

Readiness Criterion	Percentage Gained		Percentage Lost	
	Yearly Gain	Four Year Gain	Yearly Loss	Four Year Loss
<u>Overall Readiness</u>				
Year 2	+10%		-11%	
Year 4	+3%	+13%	-13%	-24%
<u>Supply Readiness</u>				
Year 1	+4%		-12%	
Year 2	+2%	+6%	-4%	-16%
<u>Training Readiness</u>				
Year 1	+8%		-12%	
Year 2	+12%		-9%	
Year 3	+12%		-6%	
Year 4	+5%	+34%	-7%	-34%
<u>Personnel Readiness</u>				
Year 1	+1%		-3%	
Year 2	+3%	+4%	-1%	-4%

Converting these readiness changes to a common dollar metric would not be nearly so easy as the conversion of manpower gains and losses. While the value associated with readiness is even more apparent than the value associated with manpower, the process of converting to a common metric is much more problematic. Are those units highest in readiness worth twice those that are lowest? Three times? Do the dollar costs of operation provide a guideline for a dollar metric? Can readiness, once converted in a dollar metric be accurately expressed in terms of a reenlistment metric? Is a 10% gain in Readiness worth 5000 reenlistments?

All of these issues must be resolved before a common metric bottom line can be added to this prototype current value human resource accounting system. The projections presented above, however, should give ample evidence of the value that is implied by positive change in the human resource management system in Navy units.

#### Discussion

All of the projections made in the previous section have relied on an enormous information base comparing human resource practices and organizational outcomes. Nonetheless, the projections are spotty, and there are only one or two examples where projections could reliably be made for all the time periods for which performance data were available.



In particular, the enormous impact on readiness which was apparent in the Multiple R analyses is only occasionally evident in these projections. This implies that with a few more units with both performance and change data, more reliable projections could be made. It also implies that the basic performance impact of HRMS change is probably underestimated by these analyses. The data, for example, show a very strong correlation with readiness in year +4. The relation to readiness in year +5, however, remains a mystery, and thus has made no contribution to the value attribution process.

### RELATIONSHIPS AMONG PERFORMANCE OUTCOMES

The HRA equations and value attribution process has relied on ten basic indicators of performance: reenlistment, UA, desertion, NJP, drug and marijuana offenses and the five readiness measures: overall, supply, equipment, training and personnel. While the relationship between UA and Desertion was dealt with briefly in the interim report (Bowers, 1983) the issue of the inter-relationship among the performance outcomes has not been systematically addressed.

One compelling reason to study the inter-relationship among the performance outcomes themselves is to resolve, or at least simplify, the common metric problem. If there were, for example, one unitary construct called performance, the common metric problem would be far simpler. In contrast, if two positive performance outcomes, such as reenlistment and readiness, proved to have a strong negative relationship--high readiness always meant low reenlistment and vice versa--the common metric problem would prove very complex indeed.

In an effort to resolve this issue, two multivariate techniques were applied to the total set of performance measures for each year separately, and then to the entire set of performance measures taken together for all years.

### Year 1 Performance Data

The structure of the Year 1 performance data, like the data for other years, was analyzed using two separate multivariate techniques. The first of these, a non-metric multidimensional scaling technique, MINISSA (Lingoes, 1973) graphically presents the intercorrelations among measures as distances in the smallest geometric space possible.

Clusters of variables, rather than the dimensions themselves are interpreted as meaningful constructs. This technique also makes only ordinal assumptions about the intercorrelations that are to be scaled as distances.

A second technique, principal components factor analysis, (Harman, 1960) estimates a series of orthogonal dimensions to account for the set of intercorrelations and generates factor loadings for each variable on all of the dimensions. This technique makes interval-level assumptions about the intercorrelations that are to be scaled. Both of these techniques have a similar purpose: to uncover a simple underlying structure from a more complex array of variables.

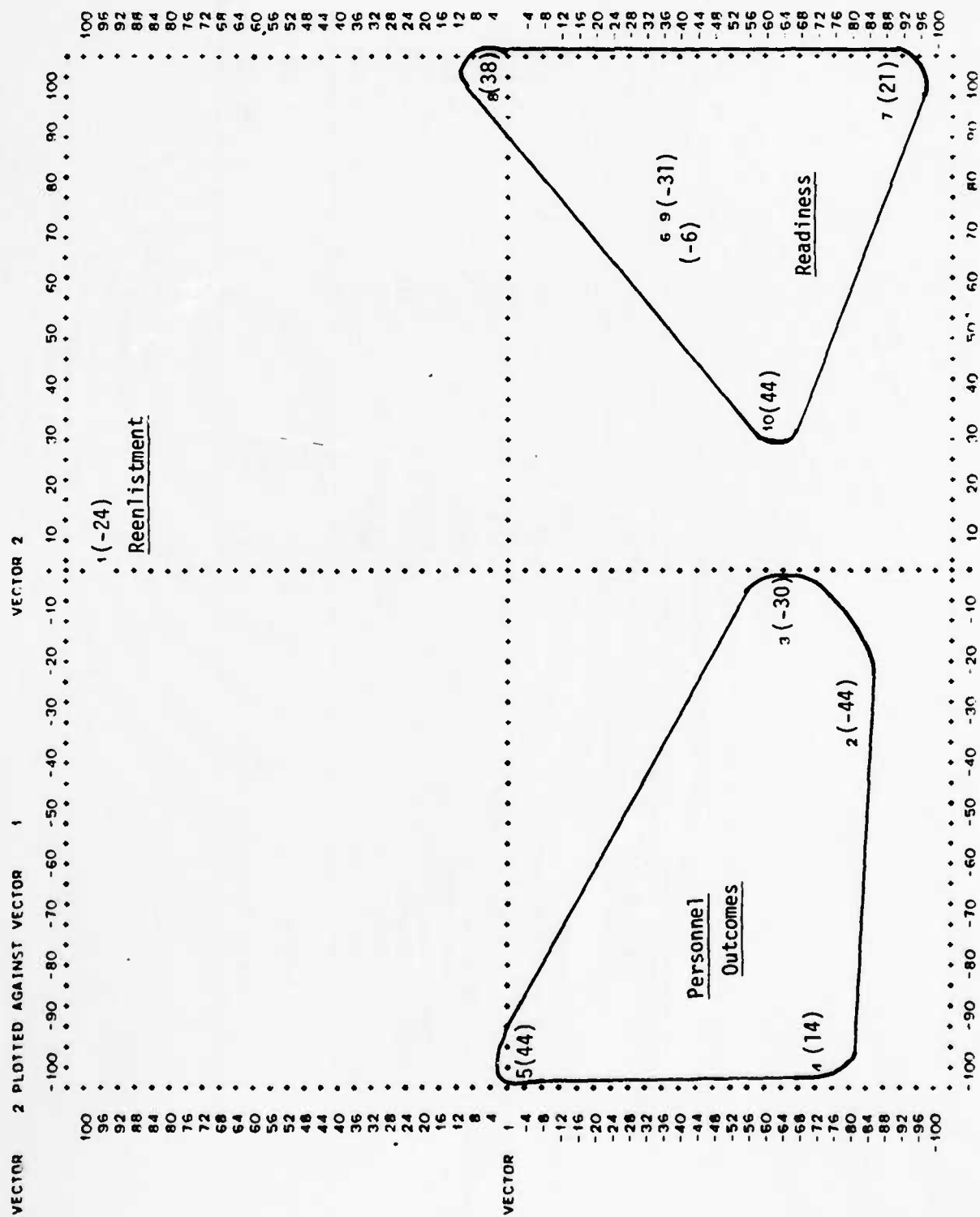
The MINISSA three dimensional plot for Year 1 performance outcomes is presented in Figure 5. The data scale extremely well in three dimensions, as indicated by the measure of "fit" (Guttman-Lingoes coefficient of alienation,  $K = .06$ ). The plot (with projections on the third dimension noted, in parentheses, for each point) displays the following variables, by number:

1. Total-term Reenlistment
2. Unauthorized Absence
3. Desertion
4. Non-Judicial Punishment
5. Drug and Marijuana Offenses
6. Overall Readiness
7. Equipment Readiness
8. Supply Readiness
9. Training Readiness
10. Personnel Readiness

Figure 5 clearly reveals a basic data structure that the rest of the analyses presented here tend to confirm: four personnel performance outcomes: UA, Desertion, NJP and Drug and marijuana offenses tend to form one cluster, while the five readiness measures form a second cluster. Reenlistment is relatively unrelated to these two general clusters. This would suggest a three-factor theory of effectiveness for Navy units--personnel outcomes (UA, NJP, etc.), performance outcomes (readiness), and manpower outcomes (reenlistment).

Table 13 presents the factor loadings for the principal components analysis of the Year 1 performance data. In this analysis, the first two factors mentioned above are clearly apparent. In the principal components analysis, reenlistment does not form a separate factor itself, but rather has a moderate loading on each of the three factors. Factor 3 in this analysis also shows evidence of one of the persistent secondary findings of these analyses of data structure: UA and Desertion tend to occur together, as do NJPs and Drug Offenses. The two pairs, however, once adjusted for a general tendency to occur together (Factor 2), tend to be negatively related. The explanation would

Figure 5 Year 1 MINISSA



k = .06

Table 13

Year 1  
Principal Components Factor Loadings

Variables	Factor 1	Factor 2	Factor 3
Reenlistment	.138	.233	.275
Unauthorized Absence	-.280	-.764	.439
Desertion	-.398	-.652	.218
Non-Judicial Punishment	.256	-.794	-.419
Drug and Marijuana	.312	-.333	-.357
Overall Readiness	-.789	.037	-.200
Equipment Readiness	-.533	.126	-.061
Supply Readiness	-.505	.340	-.123
Training Readiness	-.763	-.021	-.028
Personnel Readiness	-.580	-.095	-.199
% Total Variance	25.0	19.48	7.19
Cumulative % Total Variance	25.0	44.48	51.66

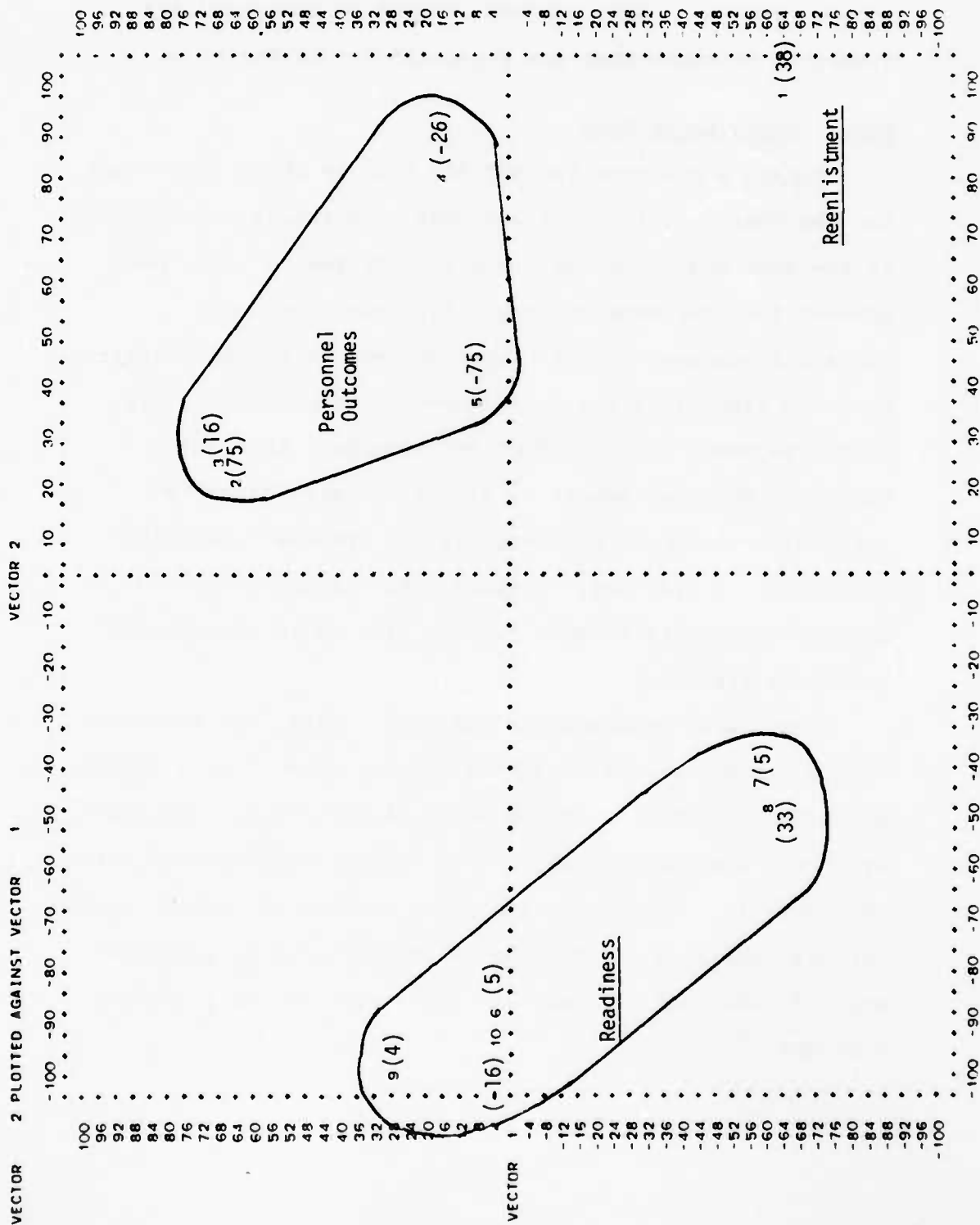
seem to be that leaving (UA or Desertion) is one response, and that staying and incurring NJPs and Drug offenses is a second response. NJPs derived from UA or Desertion are likely to be those that are accounted for by Factor 2.

#### Year 2 Performance Data

Figure 6 presents the MINISSA plot in three dimensions for the Year 2 performance outcomes. Variables are numbered in the same manner as they were for the Year 1 plot, and present much the same picture. Personnel outcomes, readiness outcomes and reenlistment seem to be relatively separate aspects of the performance of Navy units. This plot also shows another important secondary finding: Readiness measures appear to divide up into "hardware" readiness--equipment and supplies and "people" readiness--personnel and training. Notably, the overall readiness measure appears to be more closely related to the "people" readiness measures.

The factor analyses for the Year 2 data (see Table 14) show a strong overall readiness factor, as well as a general personnel outcomes factor on which UA, desertion, NJP and drug offenses load heavily. Four factors were derived from this principal components analysis, and the third and fourth factors generally reflect the "hardware" side of readiness and the "staying" vs "leaving" dimensions of the personnel outcomes

Figure 6 Year 2 MINISSA



k = .07



Table 14

Year 2

## Principal Component Factor Loadings

Variables	Factor 1	Factor 2	Factor 3	Factor 4
Reenlistment	0.290	-0.079	0.250	0.025
Unauthorized Absence	-0.000	0.651	-0.280	0.523
Desertion	-0.072	0.429	-0.116	0.151
Non-Judicial Punishment	0.289	0.594	0.303	-0.361
Drug and Marijuana	0.059	0.459	0.106	-0.402
Overall Readiness	-0.967	0.059	0.003	-0.082
Equipment Readiness	-0.416	0.121	0.455	0.102
Supply Readiness	-0.467	-0.019	0.646	0.304
Training Readiness	-0.670	0.064	-0.301	-0.081
Personnel Readiness	-0.710	0.001	-0.164	-0.257
% Total Variance	24.58	12.03	10.01	7.74
Cumulative % Total Variance	24.58	36.61	46.62	54.35

Year 3 Performance Data

Reenlistment data are unavailable for Year 3 and thus the multivariate analyses for this year's performance outcomes are based on the nine remaining variables:

1. Unauthorized Absence
2. Desertion
3. Non-Judicial Punishment
4. Drug and Marijuana Offenses
5. Overall Readiness
6. Equipment Readiness
7. Supply Readiness
8. Training Readiness
9. Personnel Readiness

The MINISSA plot in three dimensions for these nine measures of Year 3 performance are presented in Figure 7. Without the total-term reenlistment variable the data scale somewhat differently, dividing into two separate regions: Readiness and personnel outcomes. The basic divisions of equipment vs. personnel readiness outcomes, and staying vs. leaving personnel outcomes are also apparent in this plot.

The factor loadings for the principal components factor analysis for Year 3 performance outcomes are presented in Table 15.

The first factor in this analysis is the familiar Overall Readiness factor. The second factor, however, is simply the "leaving" personnel outcomes, rather than the entire set of four personnel outcomes. The "staying" personnel outcomes load heavily on the third factor, along with equipment and supply readiness, and imply that high levels of equipment and supply readiness are strongly associated with low levels of NJP and Drug Offense.

Figure 7 Year 3 MINISSA

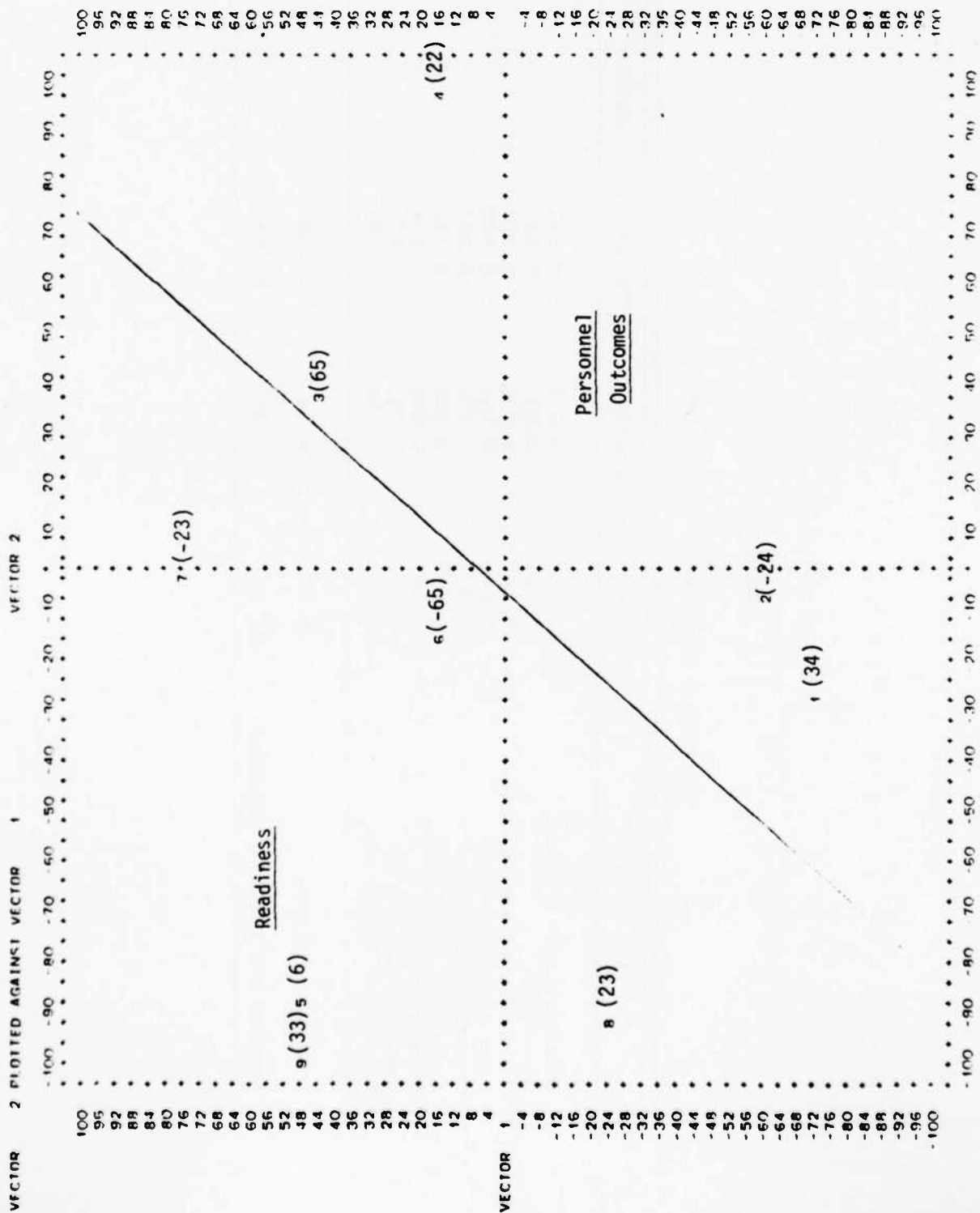


Table 15

Year 3  
Principal Components Factor Loadings

Variables	Factor 1	Factor 2	Factor 3	Factor 4
Unauthorized Absence	-0.285	0.572	-0.251	
Desertion	-0.343	0.86	-0.027	
Non-Judicial Punishment	-0.180	0.005	0.485	
Drug and Marijuana	0.031	0.162	0.569	
Overall Readiness	-0.908	-0.377	-0.043	
Equipment Readiness	-0.405	0.188	0.343	
Supply Readiness	-0.381	-0.058	0.424	
Training Readiness	-0.518	0.141	-0.271	
Personnel Readiness	-0.701	-0.358	-0.156	
% Total Variance	23.67	16.52	11.36	
Cumulative % Total Variance	23.67	40.20	51.56	

#### Year 4 Performance Data

For Year 4 only seven of the performance outcome measures remain. Both of the "leaving" Personnel outcomes are unavailable for this time period and the following seven measures remain:

1. Non-Judicial Punishment
2. Drug and Marijuana Offenses
3. Overall Readiness
4. Equipment Readiness
5. Supply Readiness
6. Training Readiness
7. Personnel Readiness

Figure 8 presents the three dimensional MINISSA solution for these seven measures. In this solution, the Readiness and Personnel outcome factors noted in earlier years are present but are less distinct. The notable exception to the expected two-factor structure is that Equipment Readiness appears to cluster with the two Personnel outcomes, NJP and Drug offenses. The principle components factor solution (see Table 16) also presents a less distinct factor structure than in any previous year, showing only one significant factor with uniformly high loadings for all variables.

#### Performance Data Across All Four Years

Clustering or factoring data from different years addresses a slightly different and somewhat more complex problem. Do the measures from one year all vary together, or do the variables cluster together across years? This part of the analysis is also complicated by a larger number of variables.

Figure 8 Year 4 MINISSA

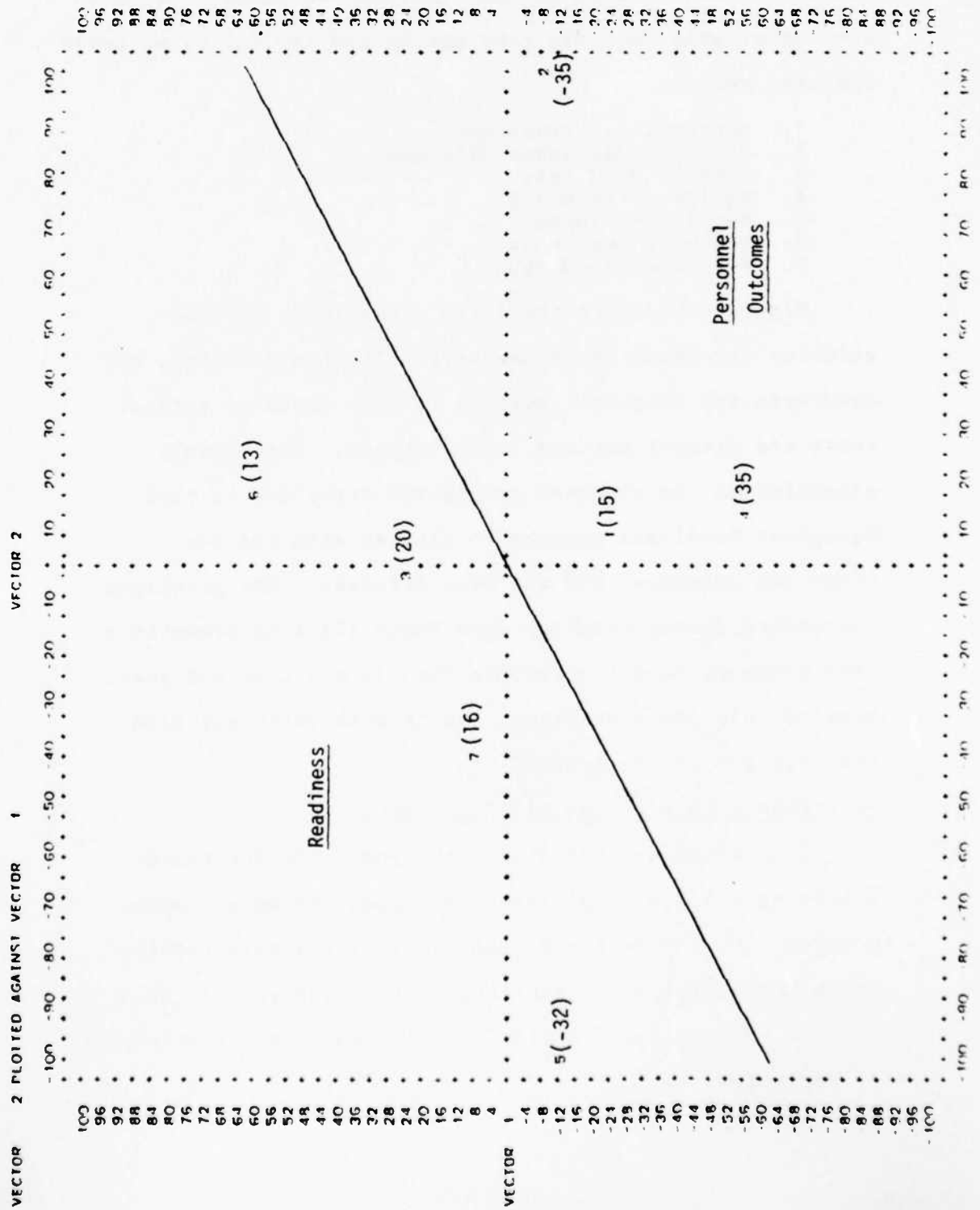


Table 16  
 Year 4  
 Principal Components Factor Loadings

Variables	Factor 1
Non-Judicial Punishment	-0.864
Drug and Marijuana	-0.465
Overall Readiness	-0.946
Equipment Readiness	-0.752
Supply Readiness	-0.449
Training Readiness	-0.793
Personnel Readiness	-0.820
% Total Variance	56.14

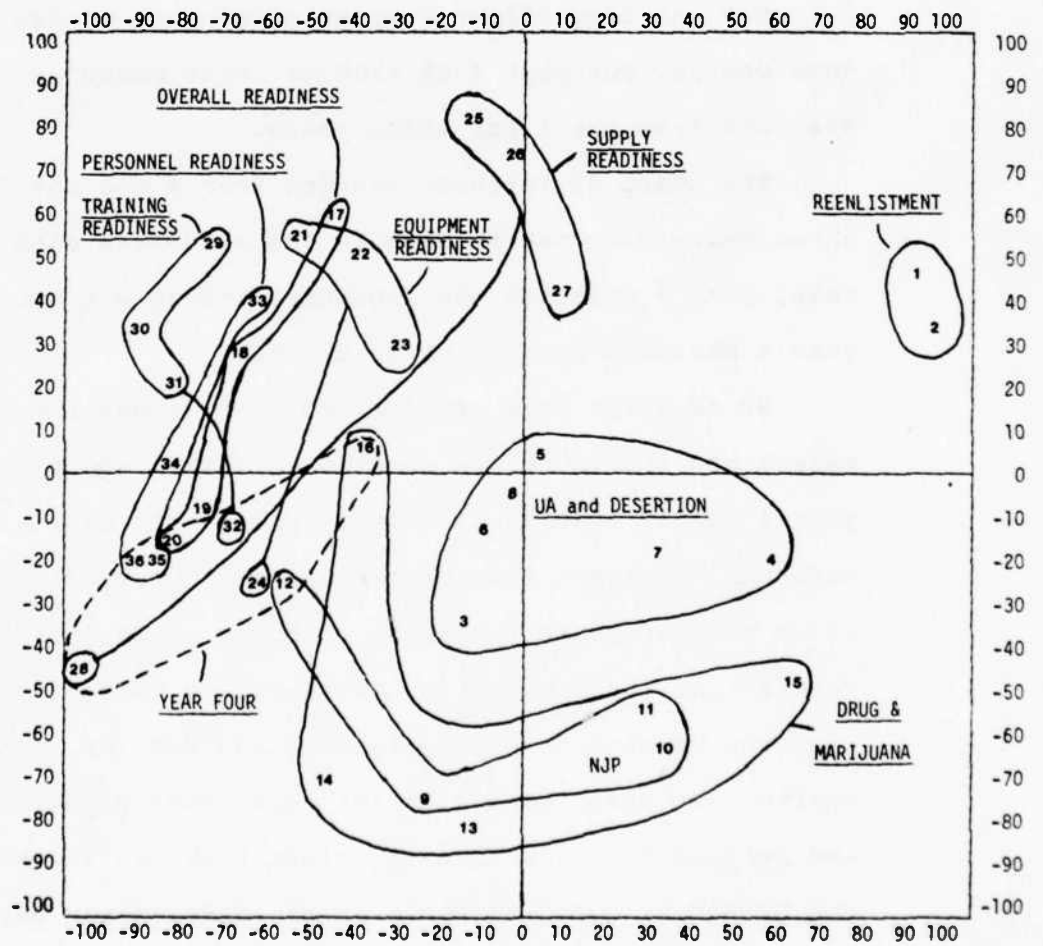
Figure 9 presents the two-dimensional MINISSA plot for the 4 performance years for which data were available. The variable numbers on this plot represent the following measures:

1. Total-term reenlistment - Year 1
2. Total-term reenlistment - Year 2
3. Unauthorized absence - Year 1
4. Unauthorized absence - Year 2
5. Unauthorized absence - Year 3
6. Desertion - Year 1
7. Desertion - Year 2
8. Desertion - Year 3
9. Non-judicial punishment - Year 1
10. Non-judicial punishment - Year 2
11. Non-judicial punishment - Year 3
12. Non-judicial punishment - Year 4
13. Drug and marijuana offenses - Year 1
14. Drug and marijuana offenses - Year 2
15. Drug and marijuana offenses - Year 3
16. Drug and marijuana offenses - Year 4
17. Overall readiness - Year 1
18. Overall readiness - Year 2
19. Overall readiness - Year 3
20. Overall readiness - Year 4
21. Equipment readiness - Year 1
22. Equipment readiness - Year 2
23. Equipment readiness - Year 3
24. Equipment readiness - Year 4
25. Supply readiness - Year 1
26. Supply readiness - Year 2
27. Supply readiness - Year 3
28. Supply readiness - Year 4
29. Training readiness - Year 1
30. Training readiness - Year 2
31. Training readiness - Year 3
32. Training readiness - Year 4
33. Personnel readiness - Year 1
34. Personnel readiness - Year 2
35. Personnel readiness - Year 3
36. Personnel readiness - Year 4

While these data do not scale well at all in only two dimensions, this over-simplified plot does represent the data structure in a way that is interpretable, and appropriate for this preliminary stage.



Figure 9  
MINISSA for Four Performance Years



$k=.25$

Reenlistment, as in the data for the individual years, remains relatively independent from the rest of the performance outcomes. UA and Desertion also form a distinct cluster, with the measures from each of the years remaining closely associated.

NJP and Drug offenses measures cluster across years to some degree, but year 4 of each of these measures is quite distinct from the first three years.

The sharp differences between Year 4 and the first three years also can be seen in the readiness data. In each case, year 4 measures are separate, and as a group all seven year 4 measures cluster quite tightly.

While these data are limited (year 4 has the fewest cases) and should not be over-interpreted, the presence of a year 4 factor that is as closely related to earlier years personnel outcomes (UA, Desertion, NJP, Drug offenses) or it is to earlier years readiness outcomes is an extremely interesting finding. Given the long lag time associated with the relationship between HRMS and FORSTAT, and the shorter lag associated with the relationship between HRMS and personnel outcomes, this information may suggest that the personnel outcomes serve as an intermediary between the management system and readiness.

Table 17 presents the factor analysis for the cross-year data. In this instance, the findings are less clear, but still intriguing. Ten separate factors resulted, but the first four account for over half of total variance. As

Table 17

## Factor Analysis of Cross Year Data

## FACTOR MATRIX (LOADINGS)

	FACTOR	1	2	3	FACTOR	4	FACTOR	5	FACTOR	6	FACTOR	7	FACTOR	8	FACTOR	9	FACTOR	10
TRR1	V6031	0.43621	0.08057	-0.00107	0.09383	0.13307	0.01985	0.1307	0.12088	0.03577	-0.33778	0.12088	0.03577	-0.33778	0.00217			
TRR2	V6032	0.51181	0.06529	-0.10881	0.17220	0.06071	0.22826	0.06071	0.23667	-0.38111	-0.56569	0.23667	-0.38111	-0.56569	-0.03525			
TRR3	V6033	0.43777	-0.49487	0.34366	0.01527	-0.05480	0.12767	-0.05480	0.41908	0.01966	-0.20372	0.41908	0.01966	-0.20372	0.07592			
TRR4	V6034	0.49767	-0.27196	-0.28372	0.07074	0.04452	0.14256	0.04452	0.20600	0.28013	0.00580	0.20600	0.28013	0.00580	-0.21124			
TRR5	V6035	-0.32794	-0.25824	-0.51121	-0.19479	-0.04161	-0.26305	-0.04161	0.15111	0.12216	0.15631	0.15111	0.12216	0.15631	0.16241			
TRR6	V6036	-0.36522	-0.38130	-0.55730	0.10092	-0.05571	0.14453	-0.05571	0.26981	-0.23179	0.18786	-0.26981	-0.23179	0.18786	0.02415			
TRR7	V6037	-0.11512	-0.42160	-0.47641	0.09402	0.12731	0.19282	0.12731	0.19822	0.13116	-0.25456	0.19822	0.13116	-0.25456	-0.05819			
TRR8	V6038	-0.37730	-0.36120	-0.67872	0.01710	-0.20559	0.11616	-0.20559	0.21576	0.10421	0.10512	0.21576	0.10421	0.10512	-0.02142			
TRR9	V6039	-0.32636	-0.90587	0.16327	0.00992	-0.13306	0.28892	-0.13306	0.09515	-0.00040	0.02883	0.09515	-0.00040	0.02883	-0.17235			
TRR10	V6040	0.02778	-0.36757	0.17311	0.52099	0.13409	0.34598	0.13409	0.05117	-0.22182	-0.10900	0.05117	-0.22182	-0.10900	0.28093			
TRR11	V6041	-0.02951	-0.33240	0.05427	0.57853	0.50306	-0.08335	0.50306	-0.08335	0.04934	0.04344	-0.08335	0.04934	0.04344	0.33871			
TRR12	V6042	-0.71170	-0.16379	0.29938	0.43419	0.20301	0.05656	0.20301	0.16422	0.14582	-0.07286	0.20301	0.14582	-0.07286	0.06711			
TRR13	V6043	-0.21534	-0.50712	0.23729	0.13184	0.17128	0.19879	0.17128	0.37577	0.03754	0.03658	0.37577	0.03754	0.03658	-0.10222			
TRR14	V6044	-0.18745	-0.16066	0.26922	0.36836	-0.10574	0.25120	-0.10574	0.44600	0.04193	-0.08369	-0.10574	0.04193	-0.08369	-0.09472			
TRR15	V6045	0.22039	-0.40615	-0.21494	0.40834	0.42887	0.01216	0.42887	0.13766	-0.29111	0.36711	0.42887	-0.29111	0.36711	-0.37844			
TRR16	V6046	-0.49034	-0.08606	-0.28624	0.18104	-0.12315	0.35174	-0.12315	0.18181	0.13913	0.11280	-0.12315	0.13913	0.11280	0.07615			
TRR17	V6047	-0.33695	0.36474	-0.27602	0.39770	-0.08059	0.37005	-0.08059	0.34879	-0.07868	0.12439	-0.08059	-0.07868	0.12439	0.09462			
TRR18	V6048	-0.69297	0.32574	-0.08486	-0.06322	0.50991	-0.05134	0.50991	0.06628	-0.11599	-0.13129	0.50991	-0.11599	-0.13129	-0.27233			
TRR19	V6049	-0.72717	0.09992	0.20748	0.02687	0.22852	0.01282	0.22852	0.06613	-0.36026	-0.11813	0.22852	-0.36026	-0.11813	0.21914			
TRR20	V6050	-0.95094	-0.11458	0.19573	-0.22772	-0.16786	0.02577	-0.16786	0.18615	0.02751	0.00299	-0.16786	0.02751	0.00299	0.11087			
TRR21	V6051	-0.32417	0.35873	-0.10765	0.30461	-0.18500	0.00702	-0.18500	0.21519	0.27121	-0.00028	0.21519	0.27121	-0.00028	0.04182			
TRR22	V6052	-0.39665	0.47111	-0.06636	0.40825	-0.07354	0.09611	-0.07354	0.09861	-0.19853	-0.03062	0.09861	-0.19853	-0.03062	-0.05120			
TRR23	V6053	-0.43304	0.21026	-0.16870	0.57347	-0.34660	0.25627	-0.34660	0.25627	-0.23614	0.16101	-0.34660	-0.23614	0.16101	-0.06900			
TRR24	V6054	0.70615	-0.05866	0.15071	0.38810	-0.58268	0.07737	-0.58268	0.21608	0.08094	-0.05498	0.21608	0.08094	-0.05498	0.20038			
TRR25	V6055	-0.05396	0.46964	-0.40510	0.19420	0.08053	0.25721	0.08053	0.11752	0.21018	-0.02150	0.11752	0.21018	-0.02150	0.01041			
TRR26	V6056	-0.08898	0.52520	-0.12072	0.35345	0.33012	0.21118	0.33012	0.15864	0.21223	-0.14563	0.33012	0.21223	-0.14563	-0.01094			
TRR27	V6057	-0.16873	0.18112	0.09271	0.34116	0.20573	0.33004	0.20573	0.07750	-0.31260	-0.08109	0.33004	-0.31260	-0.08109	-0.01248			
TRR28	V6058	-0.36565	0.12384	0.60993	-0.00300	-0.13001	-0.61603	-0.13001	0.33900	-0.00767	-0.06930	-0.13001	-0.61603	-0.00767	0.00713			
TRR29	V6059	-0.43711	0.32261	-0.50237	-0.17411	-0.03611	0.35385	-0.03611	0.23076	0.00780	0.02567	0.23076	0.00780	0.02567	0.17820			
TRR30	V6060	-0.52116	0.25677	-0.24127	-0.29300	0.27313	0.18217	0.27313	-0.14019	0.06100	0.17113	-0.14019	0.06100	0.17113	-0.18631			
TRR31	V6061	-0.05915	0.05915	-0.28863	-0.40147	0.26925	0.05800	0.26925	0.03514	-0.15357	0.14916	0.26925	-0.15357	0.14916	0.08414			
TRR32	V6062	-0.88283	-0.25108	0.06747	-0.37411	0.17455	0.05316	0.17455	0.27666	0.16334	0.02068	0.27666	0.16334	0.02068	0.09371			
TRR33	V6063	-0.46645	0.24682	-0.36020	0.04085	-0.24041	0.32604	-0.24041	0.10343	-0.35151	-0.00009	0.32604	-0.35151	-0.00009	-0.04338			
TRR34	V6064	-0.61294	0.15058	0.11957	-0.12186	0.35804	0.05558	0.35804	0.02657	-0.01840	-0.17914	0.05558	-0.01840	-0.17914	-0.23321			
TRR35	V6065	0.75185	0.02600	0.36619	-0.08365	0.13568	0.05247	0.13568	-0.05247	-0.22074	-0.00878	0.05247	-0.22074	-0.00878	0.07940			
TRR36	V6066	-0.85184	0.00822	0.41070	-0.18619	-0.12892	0.05481	-0.12892	0.08500	0.05193	-0.13998	0.08500	0.05193	-0.13998	-0.11419			

% TOTAL VARIANCE	24.16945	10.91637	9.87221	8.20496	5.77711	4.88126	4.75530	3.45749	2.88109	2.30375
CUM % TOTAL VARIANCE	24.16945	35.08582	44.95802	53.16298	58.94011	63.82436	68.58065	71.63814	74.51923	76.82297

in the MINISSA analysis above, year 4 often appears to be distinct. Here, however, measures across years appear to combine in ways suggesting performance differences that reflect underlying style differences. Factor 1, for example, loads especially strongly on readiness and contrasts situations with high readiness but lower reenlistment rates and high non-judicial punishment rates, with the reverse. It suggests, perhaps, a task-over-people performance orientation.

Factor 2, on the other hand, combines low non-judicial punishment, drug and marijuana offense, and unauthorized absence rates with high equipment, supplies, and training readiness, in a sense describing a much more wholesome performance orientation.

Factor 3 combines low unauthorized absence and desertion rates with high drug and marijuana offense rates and low training readiness. What it would seem to suggest, perhaps, is performance debilitated by drug problems.

Finally, Factor 4 combines high non-judicial and drug and marijuana offense rates with low training readiness and high equipment and supplies readiness. What this factor appears to describe, therefore, is something similar to an "inventory clerk" approach to performance.

More perhaps can and should be made of analyses such as this. The patterns presented, while puzzling, are interesting and suggestive.

### CONCLUSIONS AND IMPLICATIONS

An issue of potential importance concerns the extent to which the performance and personnel criterion measures are themselves reliable, that is, relatively free from error. Stories and suspicions of the "gundecking" of such measures abound in the Navy community. Still, the fact that they continue to be used and appear to be related to those other things to which they should be related provides some support for at least an acceptable degree of accuracy. The question, therefore, is how accurate.

Information systems, such as those which provide these criterion measures, almost never permit the kind of redundancy (multiple measures of the same thing) which internal consistency reliability would require. The alternative, a stability definition of reliability, in principle confounds unreliability with real change over time.

In an earlier study using civilian data, an attempt was made to address this question by considering short-term stability to approximate internal consistency (Pecorella, et al., 1978). Although this, in part, solved the problem, it still yielded internal consistency (alpha) coefficients for measures of total variable expenses and of absenteeism of only approximately .80.

In the present study, the performance measures yield period-to-period stability coefficients that were of two distinctly different sizes: those for Unauthorized Absence,

Desertion, Reenlistment, and Drug and Marijuana Offenses were relatively low (perhaps, on the average, .35 to .65). Those for Overall Readiness and Non-Judicial Punishment were quite high (perhaps .70 to .80). Even if the latter level obtains for all measures, however, it suggests that perhaps only 50 to 65 per cent of the performance measure variance (the square of the reliability coefficient) is real and valid.

In this context, the ability of the NHRMS indexes to predict, before it occurs, 35 to 50 per cent of the total seems impressive. They predict, in other words, much of what is there to be predicted.

An argument may be raised that focusing upon unit performance, as has occurred in this study, submerges what are vast differences among individuals. The Navy, after all, recruits, trains, assigns, rotates, and transfers individuals, not units. The unit, this line of thinking would hold, is nothing more than the sum of the individuals assigned to it, their proficiencies, performances, and the like.

Whether it is true or not that the performance of a unit is the simple sum of the performances of its members, and the present investigators are inclined to believe that it is not, the above argument appears to be seriously flawed when applied to combat units such as ships and air groups. In such situations, it is the ability of the unit to fulfill its mission that is critical. As such, unit performance,

represented by the dimensions used in the present study, is the important consideration, and differences among units on these measures are both real and crucial. Again, the ability of NHRMS measures to forecast these differences seems potentially highly valuable.

If the ability to predict differences is important, the ability to effect them is even more so. Movement in a positive direction (improvement) on the organizational processes and practices typed by the NHRMS indexes produces later improvement in readiness and personal behavior. Allowing these conditions to slip,, conversely, although it may appear to yield short-term benefit, is in the long run costly. For example, if the speculative figures used in projecting the findings Navy-wide were to hold, and the difference between being a "gainer" and a "loser" to hold as well, one could extend these to costs and savings. Although the actual cost of recruiting training and providing experience to a typical person is unknown to the present writers, it may well represent a significant amount--perhaps \$30,000 to \$50,000. If so, the savings to be realized from all becoming "gainers," even with the less than complete data available in the present study, would be approximately \$1 to \$1.5 billion. By way of contrast, the increased cost of all becoming "losers," would be about as large. To these figures, projected crudely from reenlistment predictions, one would, of course, have to add those for non-judicial punishment, unauthorized absence, drug and marijuana

offenses, and desertion rates. Nor would even these figures take account of the value of added readiness, possibly greater system reliability, or of the possibility of crew-size reduction, given better leadership and organization and higher levels of motivation and conscientiousness. In short, whether these speculations are accepted or rejected in their specificity, it is clear that there is much to be gained for the Navy in the effective management of its human resource and much to lose in neglecting it, with these effects extending far out into future years.

These findings demonstrate once again, albeit perhaps in more complete form, what previous research has shown: NHRMS measures of how units are organized, led, and managed correlate significantly with their performance. Although earlier studies showed an ability of these same measures to predict future performance, the present study has carried this line of inquiry a step further, by showing that:

- . Multivariate predictions produce a substantial ability to forecast future performance.
- . The relationships extend much farther out in time than was previously realized.
- . There is an available procedure for converting anticipated gains and losses in organizational quality and functioning into anticipated gains and losses in unit performance.
- . Both size and time lags, these relationships across time appear to be remarkably similar to those found for civilian business organizations.

For Navy personnel policy-makers, these findings carry potentially important and serious implications. It is often the case, it would seem that a Commanding Officer newly



assigned to a command assumes that he can substantially impact events, directions, and processes within the time of his tenure aboard. Indeed, the pressures of career, advancement, and appraisals strongly influence him to attend primarily to those more short-term factors that he feels are malleable (and will have payoff) within that relatively brief time.

However, these findings suggest that there is, in fact, a much stronger stream-of-effect than that assumption would warrant. A highly effective Commanding Officer, assigned to a unit with a past history of poor practices will, in all likelihood, have his record in some degree tarnished by the lagged effects of what his predecessors have done. Conversely, the poor unit performance which occurs later as a result of his poor management and leadership practices may seldom be attributed to the person who caused it. Such an individual may, in fact, often capitalize upon the past effectiveness of others.

Beyond this, the fact that these effects extend so far out in time suggests that an entire culture has been put in place, one which socializes and shapes new arrivals to its ways to a greater degree than they change it.

What is true for a Commanding Officer is even more the case for other Officers and non-commissioned officers who function in positions of supervisory leadership. It is true, as well, for non-supervisory crew members.

These apparent long-term trends need not be a cause for pessimism, however. What can be predicted can also be taken account of and, at least in some measure, augmented (if it is good) or prevented (if it is undesirable). Extended, verified, and operationalized as a tool for Navy managers, a current value system of human resources accounting of the type designed and examined in this study can become a valuable aid to long-range planning, policy-making, and capital budgeting.

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APPENDIX A

## SAMPLE AND MEASURES, SUPPORTING DATA

List of Tables and Figures

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TABLE A.1

## PROJECT UPGRADE

## "REPRESENTATIVENESS" CALCULATION FOR SHIPS

SNDL 3	GROUP	TYPE/ CLASS	NAVY N	% DF FLEET	DESIRED N	SAMPLE N	VARIANCE
Warships							
29		CG/CGN	28	4.8	4	1	-3
29A		CV/CVN	14	2.4	2	3	+1
29B		DD	52	8.9	8	5	-3
29C, D, E		DDG	41	7.0	6	6	0
29F, BB		FFG	26	4.4	4	2	-2
29G, AA		FF	59	10.1	9	11	+2
29H, J, K, L		SS	8	1.4	1	1	0
29M, P, S		SSN	94	16.1	14	12	-1
29N		SSBN: 62	10.6	9	11	+1	0
29Q		BB	1	0.2	0	0	0
29R		PHM	4	0.7	1	0	-1
2900							
Mine Warfare Ships							
30		MSD	25	4.3	4	6	+2
30A							
Amphibious Warfare Ships							
31		LCC	2	0.3	0	0	0
31A		LKA	5	0.9	1	1	0
31B		LPD	13	2.2	2	4	+2
31G, 32KK		LHA/LPH	12	2.1	2	1	-1
31H		LSD	13	2.2	2	3	+1
31J		LST	20	3.4	3	6	+3
31M							
Auxiliary Ships							
32		AD	10	1.7	1	1	0
32A		AE	12	2.1	2	2	0
32C		AFS	7	1.2	1	0	-1
32G		ADE	4	0.7	1	0	-1
32H		AD	6	1.0	1	0	-1
32N		ADR	7	1.2	1	1	0
32Q		AR	4	1.0	1	1	0
32S		AGDS	1	0.2	0	0	0
32U		ARS	7	1.2	1	1	0
32X		AS	13	2.2	2	3	+1
32DD		ASR	6	1.0	1	4	+3
32EE		ATF	5	0.9	1	1	0
32GG		AGF 3, LPD 11	2	0.3	0	0	0
32KK		AVM	1	0.2	0	0	0
32MM		ATS	3	0.5	0	0	0
32QQ		AVT	1	0.2	0	0	0
32TT							

SNDL 3	GROUP	TYPE/ CLASS	NAVY N	% OF FLEET	DESIRED N	SAMPLE N	VARIANCE
33	Patrol Craft	PCH	1	0.2	0	0	0
33B							
36	Service Craft	AFDB/AFDL AFDM/ARD ARDM MONOB DSV/DSRV IX	9 1 5 5 1	1.5 0.2 0.9 0.9 0.2	1 0 1 1 0	1 0 0 0 0	0 0 -1 -1 0
36A							
36B							
36D							
36E							
Totals			585	0.149	87	87	0

SSBN's are two crew ships, therefore, although there are only 31 ships, 62 units are counted.

TABLE A.2  
PROJECT UPGRADE  
"REPRESENTATIVENESS" CALCULATION FOR AVIATION UNITS

SNOL	GROUP	NAVY N	% OF FLEET	DESIRED N	SAMPLE N	VARIANCE
42K	VA	44	20.7	9	15	+6
42L	VF	29	13.6	4	5	+1
42N	VS	12	5.6	1	2	+1
42P	VP	37	17.4	6	8	+2
42Q	VR/VRC/VRF	6	2.8	0	2	+2
42R	VC	8	3.8	0	2	+2
42S	VX/VXE/VYN	6	2.8	0	1	+1
42T	VTC	5	2.3	0	0	0
42U	HC	7	3.3	0	2	+2
42W	HM	3	1.4	0	1	+1
42X	VO	5	2.3	0	0	0
42Y	VFP	1	0.5	0	0	0
42Z	VAO	11	5.2	1	5	+4
42BB	HS	13	6.1	1	6	+5
42CC	HSL	9	4.2	0	3	+3
42DD	VAM	14	66	1	3	+2
42GG	VFA	1	0.5	0	0	0
42HH	HAL	2	0.9	0	0	0
Totals		213	0.469	23	55	

Pearson Correlation Navy N to Sample N: 0.917 p < .01.

Pearson Correlation (Surface and Subsurface Units) Navy N to Sample N: 0.91 p < .01.

Pearson Correlation (Surface, Subsurface, and Aviation Communities) Navy N to Sample N: 0.6 p < .01.

TABLE A.3  
LIST OF HRMS INDEXES

		Mean of Question(s)
127	Communication Flow	1,2,3
128	Decision-Making Practices	4,5,6
129	Motivational Conditions	7,8,9
130	Human Resource Emphasis	10,11,12,13,14
131	Fair and Equitable Treatment	15,16,17,18
133	Supervisory Support	22,23,24,25
134	Supervisory Team Coordination	26,27
135	Supervisory Team Emphasis	28,29
136	Supervisory Goal Emphasis	30,31
137	Supervisory Work Facilitation	32,33,34
138	Peer Support	35,36,37
139	Peer Team Coordination	38,39
140	Peer Team Emphasis	40,41
141	Peer Goal Emphasis	42,43
142	Peer Work Facilitation	44,45,46
143	Peer Coordination	47,48,49,50
144	Work Group Readiness	51,52,53
145	Discipline	54,55
146	Satisfaction	56,57,58,59
		60,62,62,63
147	Lower Level Influence	64,65
148	Training	66,67,68
149	Equal Employment Opportunity	69,70,71
		72,73,74
150	Drug and Alcohol Abuse*	

\*pre form-21 HRMS



TABLE A.4

## List of Alpha Coefficients for HRMS Indexes

Index	Alpha
Communication Flow	.6959
Decision-making Practices	.8141
Motivation	.8044
Human Resource Emphasis	.8407
Supervisory Support	.9268
Supervisory Team Coordination	.8519
Supervisory Team Emphasis	.9083
Supervisory Goal Emphasis	.7477
Supervisory Work Facilitation	.9073
Work Group Support	.8519
Work Group Team Coordination	.8358
Work Group Team Emphasis	.8895
Work Group Goal Emphasis	.8031
Work Group Facilitation	.8633
Work Group Coordination	.8774
Work Group Readiness	.7925
Work Group Discipline	.8726
Satisfaction	.8655
Lower Level Influence	.7842
Training	.7662
Drug & Alcohol	.8432
Goal Integration	.7539
Military/Civilian Interface	.4150

Table A.5a

## Correlations for First-Term Reenlistment

VARIABLE	-0-	(1)	-0-	(1)	-0-	(1)	-0-	(1)	-0-	(1)	-0-	(1)	-0-	(1)	-0-	(1)	-0-	(1)
5092.FTM8	-0-	(1)	-0-	(1)	-0-	(1)	-0-	(1)	-0-	(1)	-0-	(1)	-0-	(1)	-0-	(1)	-0-	(1)
5093.FTM7	.1857 (3)	- .6329 (3)	- .4718 (3)	- .9388 (3)	.3341 (3)	.4648 (3)	.4351 (3)	.2770 (3)	.2212 (3)	.3721 (3)	.4267 (3)	.3383 (3)						
5094.FTM6	.0906 (8)	- .3047 (8)	- .1403 (8)	- .4415 (8)	.0232 (8)	.1975 (8)	.2597 (8)	.3306 (8)	.4141 (8)	.4121 (8)	.3826 (8)	.3042 (8)						
5095.FTM5	- .1307 (16)	- .0736 (16)	- .1402 (16)	.0564 (16)	.1344 (16)	.0564 (16)	.0607 (16)	.2830 (16)	.0715 (16)	.2016 (16)	.2257 (16)	.1545 (16)						
5096.FTM4	- .2378 (28)	- .2965 (28)	- .2208 (28)	- .2627 (28)	- .2238 (28)	- .1758 (28)	.0124 (28)	.0001 (28)	.2101 (28)	.0203 (28)	.1857 (28)	.2340 (28)						
5097.FTM3	- .1669 (39)	- .1399 (39)	- .1343 (39)	- .1533 (39)	- .1414 (39)	.0340 (39)	- .0154 (39)	.0483 (39)	.0249 (39)	.0018 (39)	.1071 (39)	.0167 (39)						
5098.FTM2	.0206 (63)	.0312 (63)	- .0091 (63)	- .0312 (63)	.0305 (63)	.1057 (63)	.1098 (63)	.0365 (63)	.1857 (63)	.1047 (63)	.2324 (63)	.2094 (63)						
5099.FTM1	- .0848 (63)	- .0698 (63)	- .0831 (63)	- .1323 (63)	- .0076 (63)	- .0823 (63)	- .0296 (63)	.0908 (63)	.0271 (63)	.0119 (63)	.0882 (63)	.1357 (63)						
5100.FT0	.3428 (95)	.2731 (95)	.2675 (95)	.2355 (95)	.3055 (95)	.2318 (95)	.2082 (95)	.2078 (95)	.2440 (95)	.2844 (95)	.2383 (95)	.2951 (95)						
5101.FT1	.1164 (91)	.0908 (91)	- .0022 (91)	.0532 (91)	.1101 (91)	.1468 (91)	.1349 (91)	.0640 (91)	.1530 (91)	.1326 (91)	.2057 (91)	.2338 (91)						
5102.FT2	.1788 (98)	.1421 (98)	.0744 (98)	.1437 (98)	.1483 (98)	.0922 (98)	.1100 (98)	.1082 (98)	.0792 (98)	.1502 (98)	.0528 (98)	.1296 (98)						
5103.FT3	.3106 (100)	.2105 (100)	.1638 (100)	.2001 (100)	.2225 (100)	.2839 (100)	.2736 (100)	.2376 (100)	.2707 (100)	.2668 (100)	.2469 (100)	.3032 (100)						
5104.FT4	.0950 (91)	.0708 (91)	.0991 (91)	.0847 (91)	.1486 (91)	.1681 (91)	.1989 (91)	.1065 (91)	.1321 (91)	.1824 (91)	.2724 (91)	.3578 (91)						
5105.FT5	.0713 (88)	.0458 (88)	.0257 (88)	.0703 (88)	.1392 (88)	.1820 (88)	.1685 (88)	.1297 (88)	.1211 (88)	.1734 (88)	.2083 (88)	.2879 (88)						
5106.FT6	.1512 (65)	.0829 (65)	.1401 (65)	.1187 (65)	.2132 (65)	.2514 (65)	.2176 (65)	.1912 (65)	.2271 (65)	.2940 (65)	.3062 (65)	.3208 (65)						
5107.FT7	.3502 (54)	.2045 (54)	.1160 (54)	.1789 (54)	.1482 (54)	.2204 (54)	.1858 (54)	.0675 (54)	.1602 (54)	.1977 (54)	.2805 (54)	.3619 (54)						
5108.FT8	.2363 (33)	.0765 (33)	.0383 (33)	.1412 (33)	.1281 (33)	.1694 (33)	.0676 (33)	.0366 (33)	.0700 (33)	.2700 (33)	.0616 (33)	.1347 (33)						
5109.FT9	- .0628 (29)	- .2833 (29)	- .3641 (29)	- .2656 (29)	- .2310 (29)	- .1903 (29)	- .2208 (29)	- .2655 (29)	- .2119 (29)	- .2063 (29)	.0823 (29)	.1417 (29)						
	127.	128.	129.	130.	131.	133.	134.	135.	136.	137.	138.	139.						
	1 COMM F 2 DEC MA 3 MOTIVA 4 HUM RE 5 FAIR-E 7 SUP SU 8 SUP TE 9 SUP TE 10 SUP G 11 SUP W 12 WKGRP 13 WKGRP	1 COMM F 2 DEC MA 3 MOTIVA 4 HUM RE 5 FAIR-E 7 SUP SU 8 SUP TE 9 SUP TE 10 SUP G 11 SUP W 12 WKGRP 13 WKGRP	1 COMM F 2 DEC MA 3 MOTIVA 4 HUM RE 5 FAIR-E 7 SUP SU 8 SUP TE 9 SUP TE 10 SUP G 11 SUP W 12 WKGRP 13 WKGRP	1 COMM F 2 DEC MA 3 MOTIVA 4 HUM RE 5 FAIR-E 7 SUP SU 8 SUP TE 9 SUP TE 10 SUP G 11 SUP W 12 WKGRP 13 WKGRP	1 COMM F 2 DEC MA 3 MOTIVA 4 HUM RE 5 FAIR-E 7 SUP SU 8 SUP TE 9 SUP TE 10 SUP G 11 SUP W 12 WKGRP 13 WKGRP	1 COMM F 2 DEC MA 3 MOTIVA 4 HUM RE 5 FAIR-E 7 SUP SU 8 SUP TE 9 SUP TE 10 SUP G 11 SUP W 12 WKGRP 13 WKGRP	1 COMM F 2 DEC MA 3 MOTIVA 4 HUM RE 5 FAIR-E 7 SUP SU 8 SUP TE 9 SUP TE 10 SUP G 11 SUP W 12 WKGRP 13 WKGRP	1 COMM F 2 DEC MA 3 MOTIVA 4 HUM RE 5 FAIR-E 7 SUP SU 8 SUP TE 9 SUP TE 10 SUP G 11 SUP W 12 WKGRP 13 WKGRP	1 COMM F 2 DEC MA 3 MOTIVA 4 HUM RE 5 FAIR-E 7 SUP SU 8 SUP TE 9 SUP TE 10 SUP G 11 SUP W 12 WKGRP 13 WKGRP	1 COMM F 2 DEC MA 3 MOTIVA 4 HUM RE 5 FAIR-E 7 SUP SU 8 SUP TE 9 SUP TE 10 SUP G 11 SUP W 12 WKGRP 13 WKGRP	1 COMM F 2 DEC MA 3 MOTIVA 4 HUM RE 5 FAIR-E 7 SUP SU 8 SUP TE 9 SUP TE 10 SUP G 11 SUP W 12 WKGRP 13 WKGRP	1 COMM F 2 DEC MA 3 MOTIVA 4 HUM RE 5 FAIR-E 7 SUP SU 8 SUP TE 9 SUP TE 10 SUP G 11 SUP W 12 WKGRP 13 WKGRP	1 COMM F 2 DEC MA 3 MOTIVA 4 HUM RE 5 FAIR-E 7 SUP SU 8 SUP TE 9 SUP TE 10 SUP G 11 SUP W 12 WKGRP 13 WKGRP	1 COMM F 2 DEC MA 3 MOTIVA 4 HUM RE 5 FAIR-E 7 SUP SU 8 SUP TE 9 SUP TE 10 SUP G 11 SUP W 12 WKGRP 13 WKGRP	1 COMM F 2 DEC MA 3 MOTIVA 4 HUM RE 5 FAIR-E 7 SUP SU 8 SUP TE 9 SUP TE 10 SUP G 11 SUP W 12 WKGRP 13 WKGRP	1 COMM F 2 DEC MA 3 MOTIVA 4 HUM RE 5 FAIR-E 7 SUP SU 8 SUP TE 9 SUP TE 10 SUP G 11 SUP W 12 WKGRP 13 WKGRP	1 COMM F 2 DEC MA 3 MOTIVA 4 HUM RE 5 FAIR-E 7 SUP SU 8 SUP TE 9 SUP TE 10 SUP G 11 SUP W 12 WKGRP 13 WKGRP	1 COMM F 2 DEC MA 3 MOTIVA 4 HUM RE 5 FAIR-E 7 SUP SU 8 SUP TE 9 SUP TE 10 SUP G 11 SUP W 12 WKGRP 13 WKGRP

Table A.5a (Continued)

Table A.5b

[illegible]

Table A.5b (Continued)

TABLE A.6a  
Correlations Between Unexcused Absence Rates\*  
and Wave 1 HRMS Indexes

VARIABLE	4218 (4)	-6968 (4)	-4884 (4)	-3432 (4)	-2208 (4)	-1106 (4)	-1509 (4)	-3274 (4)	-3993 (4)	-2569 (4)	-2765 (4)	-3130 (4)
4003. UAM3												
4004. UAM2	-4702 (26)	-4790 (26)	-4053 (26)	-4111 (26)	-3804 (26)	-4734 (26)	-5787 (26)	-3924 (26)	-3678 (26)	-4119 (26)	-3397 (26)	-4640 (26)
4005. UAM1	-3937 (65)	-3794 (65)	-3682 (65)	-3663 (65)	-4268 (65)	-4850 (65)	-4743 (65)	-4145 (65)	-4154 (65)	-4059 (65)	-3123 (65)	-4259 (65)
4006. UAO	-3795 (106)	-3330 (106)	-3817 (106)	-2811 (106)	-3495 (106)	-5081 (106)	-5077 (106)	-4185 (106)	-4057 (106)	-4615 (106)	-5741 (106)	-5770 (106)
4007. UA1	-3318 (140)	-3277 (140)	-3617 (140)	-3790 (140)	-3353 (140)	-4695 (140)	-4962 (140)	-3612 (140)	-3825 (140)	-4289 (140)	-4129 (140)	-5103 (140)
4008. UA2	-3660 (140)	-3517 (140)	-4336 (140)	-3850 (140)	-4144 (140)	-5035 (140)	-5057 (140)	-3932 (140)	-4318 (140)	-4610 (140)	-4288 (140)	-5279 (140)
4009. UA3	-3724 (136)	-3562 (136)	-4164 (136)	-3798 (136)	-4162 (136)	-5168 (136)	-5028 (136)	-3870 (136)	-4332 (136)	-4517 (136)	-4682 (136)	-4702 (136)
4010. UA4	-2902 (114)	-2413 (114)	-2194 (114)	-2719 (114)	-2494 (114)	-2190 (114)	-2549 (114)	-2429 (114)	-2263 (114)	-2046 (114)	-2418 (114)	-2674 (114)
4011. UA5	-3231 (75)	-2953 (75)	-3688 (75)	-3553 (75)	-3366 (75)	-5043 (75)	-4809 (75)	-3024 (75)	-3689 (75)	-4225 (75)	-5036 (75)	-5641 (75)
4012. UA6	-1770 (34)	-1254 (34)	-1717 (34)	-2047 (34)	-2723 (34)	-2224 (34)	-2051 (34)	-1773 (34)	-1691 (34)	-2534 (34)	-3101 (34)	-4977 (34)
127. 1 COMM	127.	128.	129.	130.	131.	133.	134.	135.	136.	137.	138.	139.
F 2 DEC	F 2 DEC	MA 3 MOTIVA	4 HUM RE	5 FAIR-E	7 SUP	SU 8 SUP	TE 9 SUP	TE 10 SUP	G 11 SUP	W 12 WKGRP	13 WKGRP	

\* Unexcused Absence rates are for 3 six-month periods preceding the survey (UAM3, UAM2, UAM1), a concurrent period (UA0), and 6 periods following the survey (UA1, UA2, etc.)

Table A.6a

Variable

Table A.6b  
Correlations Between Desertion Rates\*  
Wave 1 HRMS Indexes

VARIABLE	- 9609 (4)	- 6525 (4)	- 6029 (4)	- 1351 (4)	- 7890 (4)	- 7159 (4)	- 7816 (4)	- 9200 (4)	- 9635 (4)	- 9176 (4)	- 8938 (4)	- 9482 (4)														
4103.DXM3																										
4104.DXM2	- 5162 (26)	- 5887 (26)	- 5392 (26)	- 4638 (26)	- 5468 (26)	- 4534 (26)	- 5494 (26)	- 4033 (26)	- 4315 (26)	- 4120 (26)	- 3101 (26)	- 4017 (26)														
4105.DXM1	- 4787 (65)	- 4590 (65)	- 4567 (65)	- 4547 (65)	- 4790 (65)	- 5279 (65)	- 5504 (65)	- 4873 (65)	- 4381 (65)	- 4960 (65)	- 3984 (65)	- 4959 (65)														
4106.DX0	- 4699 (106)	- 4434 (106)	- 4794 (106)	- 3976 (106)	- 5173 (106)	- 5841 (106)	- 6049 (106)	- 5175 (106)	- 5692 (106)	- 5680 (106)	- 5614 (106)	- 6228 (106)														
4107.DX1	- 3352 (140)	- 3072 (140)	- 3696 (140)	- 3538 (140)	- 3487 (140)	- 4297 (140)	- 4814 (140)	- 3784 (140)	- 3833 (140)	- 4162 (140)	- 3717 (140)	- 4512 (140)														
4108.DX2	- 3750 (140)	- 3574 (140)	- 4345 (140)	- 3932 (140)	- 4050 (140)	- 4364 (140)	- 4792 (140)	- 4262 (140)	- 4623 (140)	- 4672 (140)	- 4176 (140)	- 5132 (140)														
4109.DX3	- 3767 (136)	- 3349 (136)	- 4128 (136)	- 3732 (136)	- 3851 (136)	- 5168 (136)	- 5351 (136)	- 4391 (136)	- 4674 (136)	- 4852 (136)	- 4641 (136)	- 5319 (136)														
4110.DX4	- 3183 (114)	- 2528 (114)	- 3138 (114)	- 3125 (114)	- 3586 (114)	- 4501 (114)	- 4789 (114)	- 3469 (114)	- 4181 (114)	- 4278 (114)	- 5350 (114)	- 5500 (114)														
4111.DX5	- 3134 (75)	- 2530 (75)	- 3048 (75)	- 3291 (75)	- 3017 (75)	- 3711 (75)	- 3357 (75)	- 2400 (75)	- 2595 (75)	- 2940 (75)	- 4206 (75)	- 5026 (75)														
4112.DX6	- 1929 (34)	- 1168 (34)	- 1537 (34)	- 1705 (34)	- 1916 (34)	- 2063 (34)	- 1472 (34)	- 1327 (34)	- 1321 (34)	- 2039 (34)	- 3515 (34)	- 4374 (34)														
127.	128.	129.	130.	131.	132.	133.	134.	135.	136.	137.	138.	139.														
1	COMM	F	2	DEC	MA	3	MOTIVA	4	HJM	RE	5	FAIR-E	7	SUP	8	SU	9	SUP	10	SUP	11	SUP	12	WKGRP	13	WKGRP

\*Desertion rates are for 3 six-month periods preceding the survey (DXM3, DXM2, DXM1), a concurrent period (DX0), and 6 six-month periods following the survey (DX1, DX2, etc.)



Table A.6b (Continued)

4103.DXM3	2254 (4)	-7593 (4)	-7368 (4)	-8826 (4)	-9998 (3)	-7412 (4)	-9208 (4)	.2753 (4)	-.0146 (4)	-.9725 (4)	-.9213 (4)
4104.DXM2	-4146 (26)	-4891 (26)	-4233 (26)	-4229 (26)	-2359 (21)	-5032 (26)	-4931 (26)	-1800 (26)	-.5047 (26)	-.5169 (26)	-.5054 (26)
4105.DXM1	-4643 (65)	-5545 (65)	-5339 (65)	-5222 (65)	-3996 (51)	-4635 (65)	-5344 (65)	-3592 (65)	-.5056 (65)	-.5705 (65)	-.4856 (65)
4106.DX0	-4840 (106)	-6237 (106)	-5769 (106)	-6522 (106)	-4867 (87)	-5716 (106)	-5860 (106)	-3304 (106)	-.4968 (106)	-.6191 (106)	-.4351 (106)
4107.DX1	-4137 (140)	-5268 (140)	-5160 (140)	-4430 (140)	-3214 (115)	-4070 (140)	-4238 (140)	-3810 (140)	-.4068 (140)	-.4200 (140)	-.3067 (140)
4108.DX2	-5406 (140)	-5975 (140)	-5707 (140)	-5226 (140)	-3914 (115)	-4435 (140)	-5125 (140)	-3956 (140)	-.4643 (140)	-.4600 (140)	-.3259 (140)
4109.DX3	-5008 (136)	-5946 (136)	-5622 (136)	-5285 (136)	-3830 (112)	-4832 (136)	-4815 (136)	-3866 (136)	-.4476 (136)	-.4676 (136)	-.3575 (136)
4110.DX4	-4443 (114)	-5167 (114)	-5079 (114)	-5099 (114)	-3506 (94)	-3958 (114)	-4025 (114)	-3835 (114)	-.3322 (114)	-.4470 (114)	-.3101 (114)
4111.DX5	-4150 (75)	-4868 (75)	-4497 (75)	-4776 (75)	-4476 (64)	-3450 (75)	-3819 (75)	-4093 (75)	-.3625 (75)	-.3568 (75)	-.3214 (75)
4112.DX6	-3366 (34)	-3241 (34)	-3482 (34)	-3883 (34)	-4497 (28)	-2130 (34)	-2014 (34)	-2127 (34)	-.1706 (34)	-.1835 (34)	-.1687 (34)
	140.	141.	142.	143.	144.	145.	146.	147.	148.	149.	152.
	14 WKGRP	15 WKGRP	16 WKGRP	17 WKGRP	18 WKGRP	19 WKGRP	20 SATIS	21 LOWER	22 TRAIN	23 EQUAL	26 PERSD

Table A.7  
Starting Point for Gainers and Losers: Readiness Gains and Losses Relative to the Fleet

FORSTAT Ratings	Gainers			Losers			Increment			Decrement		
	Base $\bar{x}$	%ile	Base $\bar{x}$	%ile	Change	New $\bar{x}$	%Fleet	Change	New $\bar{x}$	%Fleet	Change	New $\bar{x}$
OR2	2.89	45	3.12	59	.179	3.07	(55)	+.150	2.97	(48)	-.11	2.76
OR4	2.77	53	2.88	56	.114	2.88	(56)	+.298	2.58	(43)	-.13	2.45
SU1	1.52	50	1.82	65	.077	1.60	(54)	+.247	1.57	(53)	-.12	1.45
SU2	1.58	58	1.69	63	.030	1.61	(60)	+.090	1.60	(59)	-.04	1.56
TR1	1.80	50	2.06	62	.160	1.96	(58)	+.250	1.81	(50)	-.12	1.69
TR2	1.95	52	2.09	61	.306	2.26	(64)	+.092	2.00	(52)	-.09	1.91
TR3	1.94	51	1.96	53	.284	2.22	(63)	+.093	1.87	(47)	-.06	1.81
TR4	1.83	53	2.24	59	.314	2.14	(58)	+.445	1.80	(52)	-.07	1.73
PE1	2.12	54	2.18	57	.022	2.14	(55)	+.062	2.12	(54)	-.02	2.10
PE2	2.49	51	2.65	56	.083	2.57	(54)	+.041	2.61	(55)	-.01	2.60

APPENDIX BUNSTANDARDIZED REGRESSION WEIGHTS AND  
CONSTANTS FOR HRA EQUATIONSList of Tables

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- B.2 NHRMS Regression Weights and Constants for Unauthorized Absence
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- B.10 NHRMS Regression Weights and Constants for Personnel Readiness Equations

Table B.1

NHRMS Regression Weights and Constants for  
Reenlistment Equations

HRMS Predictors	Performance Periods									
	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>	T <sub>7</sub>	T <sub>8</sub>	T <sub>9</sub>
Fair & Equitable Treatment	-1.27	-1.16	-.70	-.07	-1.14	-.18	.91	-3.22	1.22	3.05
Work Group Discipline	.37	1.36	-.32	.45	.58	1.08	1.20	1.24	.83	1.94
Satisfaction	2.79	-.79	.30	-2.81	-.30	-.35	3.80	-.42	2.95	-3.29
Lower Level Influence	-.50	-.78	-.97	-.38	-.70	1.52	-2.99	-1.11	.10	.99
Training	.38	1.33	1.41	2.31	-.58	1.19	2.19	2.10	5.02	3.31
Equal Opportunity	1.28	1.44	.62	1.76	1.57	.68	1.28	.99	1.89	1.92
Command Climate	-.40	.06	.69	-.46	1.03	-1.59	-3.69	2.15	-4.86	-2.42
Supervisory Leadership	-2.58	-1.83	-.64	-.13	-2.30	-1.05	-.77	-3.53	-.69	-6.72
Peer Leadership	.63	.99	.20	.74	3.88	-.14	-1.12	2.71	-5.29	1.63
Constant	-2.99	-2.59	-2.03	-4.20	-7.14	-3.03	-4.77	-2.91	-3.36	1.81

Table B.2  
NHRMS Regression Weights and Constants for  
Unauthorized Absence

HRMS Predictors	<u>Performance Periods</u>						
	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>
Fair & Equitable Treatment	1.71	1.70	.72	.51	.43	.72	-1.72
Work Group Discipline	.02	-.84	-.77	-.70	-.40	-.60	.26
Satisfaction	-1.46	.41	-.12	-.11	.32	-.85	.70
Lower Level Influence	1.35	.30	.24	.18	-.01	.46	1.13
Training	.42	-.55	-.58	-.35	-.03	.01	-.07
Equal Opportunity	-1.21	-.30	-.30	-.62	-.59	-.12	2.04
Command Climate	-.29	-.30	.29	.33	-.62	.47	-.10
Supervisory Leadership	-.10	.56	.41	-.55	.80	.66	.53
Peer Leadership	-2.10	-3.55	-2.08	-.58	-1.28	-1.71	-5.24
Constant	7.28	9.33	7.57	6.72	4.39	6.40	7.72

Table B.3  
NHRMS Regression Weights and Constants for  
Desertion Equations

HRMS Predictors	Performance Periods						
	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>
Fair & Equitable Treatment	.12	.58	.56	.82	.09	.57	1.01
Work Group Discipline	-.54	-.49	-.44	-.77	-.22	-.29	.49
Satisfaction	.19	.53	-.47	.23	.41	.50	1.93
Lower Level Influence	.24	-.62	-.25	.07	.21	-.57	-.77
Training	-.44	-.45	-.51	-.51	.08	-.09	1.58
Equal Opportunity	-1.27	-.16	.34	-.03	-.60	.08	.55
Command Climate	.82	.35	.12	.25	.65	-.62	-1.70
Supervisory Leadership	-.61	-.17	.89	-.86	-.20	1.70	2.58
Peer Leadership	-.82	-1.90	-3.00	-1.63	-2.78	-3.03	-7.90
Constant	8.17	7.61	8.99	8.63	8.39	5.04	6.97

Table B.4  
NHRMS Regression Weights and Constants for  
Non-Judicial Punishment Rates

NHRMS Predictors	Performance Periods															
	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>	T <sub>7</sub>	T <sub>8</sub>	T <sub>9</sub>	T <sub>10</sub>	T <sub>11</sub>	T <sub>12</sub>	T <sub>13</sub>	T <sub>14</sub>	T <sub>15</sub>
Fair & Equitable Treatment	.73	.19	-.13	2.95	1.53	.76	1.24	.66	.84	.37	.11	1.14	1.59	.79	.96	.74
Work Group Discipline	-.41	.43	-.33	-.67	-1.56	.51	-.05	-.25	.07	-.32	.30	-1.72	-.54	-1.64	-.56	-.61
Satisfaction	-4.60	-4.14	-1.70	-1.37	-1.94	-2.98	-3.08	-1.27	-4.35	-1.98	-2.24	-.97	-3.09	.30	-1.99	-.96
Lower Level Influence	.69	1.66	.91	1.83	.43	1.50	-.74	-.20	-.09	-1.31	-.23	-.74	.47	.28	-.38	.09
Training	1.34	.89	1.61	.88	-.41	1.92	1.72	1.34	2.16	1.32	2.15	-.06	.46	-.21	.40	-.97
Equal Opportunity	-2.13	-2.19	-.30	2.17	-1.25	-.98	-.51	-.79	-.17	-.94	-.35	-1.38	-.54	.90	-.60	-2.58
Command Climate	-.80	.30	-.54	-2.67	.76	.14	.90	.43	1.10	2.44	1.00	1.53	2.01	-.42	.10	.00
Supervisory Leadership	1.48	2.30	.52	-.50	1.90	-2.82	-1.37	-.79	-.40	-1.47	-2.39	-1.25	-2.63	-3.22	1.78	6.53
Peer Leadership	3.20	-.10	-.86	-4.40	-.86	.93	.45	-.56	-1.29	-.85	-.49	1.26	.38	1.14	-1.13	-2.66
Constant	2.46	3.51	3.60	7.76	5.58	5.85	6.35	5.78	8.93	10.61	8.86	8.43	8.90	7.72	4.92	.53

Table B.5  
NHRMS Regression Weights and Constants for  
Drug and Marijuana Offense Rates

NHRMS Predictors	Performance Periods																
	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>	T <sub>7</sub>	T <sub>8</sub>	T <sub>9</sub>	T <sub>10</sub>	T <sub>11</sub>	T <sub>12</sub>	T <sub>13</sub>	T <sub>14</sub>	T <sub>15</sub>	T <sub>16</sub>
Fair & Equitable Treatment	-1.99	-.43	-1.08	1.84	-.71	.60	3.04	1.07	.63	.36	.08	.87	.60	1.36	1.09	.26	1.38
Work Group Discipline	1.37	.66	.16	-1.10	-.34	.15	-.19	-.28	-.11	-1.26	1.63	-.99	-.13	-.79	-.16	-1.08	.93
Satisfaction	-1.39	-4.64	.50	2.02	-2.44	-2.29	-4.20	-.95	-3.43	-1.61	-3.33	-2.08	-3.12	-.81	-1.76	.02	-.45
Lower Level Influence	.27	-1.69	-1.42	.26	-1.68	1.40	-1.39	.45	-.28	-1.95	1.15	-1.22	1.33	-1.06	-.90	-.22	-3.83
Training	2.27	2.20	.87	-.09	1.17	.40	1.98	-.43	.27	.03	1.64	-.14	-.09	-.33	.80	-.86	3.03
Equal Opportunity	-.12	-2.36	-1.11	.54	-1.22	-1.55	-1.88	-1.34	-.58	.12	-.99	-2.58	1.05	.69	-.75	.00	2.13
Command Climate	-1.30	3.38	2.59	-1.30	1.81	.08	-.09	.38	1.74	2.99	-1.05	2.72	2.47	.02	-.59	.71	-1.08
Supervisory Leadership	-5.51	1.05	-1.69	.43	.44	-.33	2.35	.24	.38	-1.04	-.17	.22	-.62	-2.68	4.13	2.17	2.59
Peer Leadership	6.31	1.60	-.30	-3.97	1.89	1.02	.10	-.54	.29	-.44	.12	1.40	-.53	1.72	-3.15	-2.88	-8.16
Constant	.75	2.16	4.94	5.07	3.52	3.00	2.36	5.45	4.77	10.06	4.05	7.00	6.10	6.43	3.96	6.08	10.09



Table B.6  
NHRMS Regression Weights and Constants for  
Overall Unit Readiness

HMMS Predictors	Performance Periods															
	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>	T <sub>7</sub>	T <sub>8</sub>	T <sub>9</sub>	T <sub>10</sub>	T <sub>11</sub>	T <sub>12</sub>	T <sub>13</sub>	T <sub>14</sub>	T <sub>15</sub>
Fair & Equitable Treatment	-.42	-.49	-1.23	-.13	.18	.58	.34	-.42	.61	.39	-.49	-1.58	-1.37	-2.54	-.53	4.03
Work Group Discipline	.39	1.28	1.03	1.40	.05	.58	-.04	.31	1.00	.69	-.12	.05	.15	-1.39	-.60	-.96
Satisfaction	-2.77	-3.07	-1.86	-2.18	-.87	2.42	2.45	1.55	1.29	2.79	2.72	.43	3.74	3.69	1.66	-1.42
Lower Level Influence	-.85	.19	.10	.05	-.40	.12	1.59	.78	1.40	.45	-1.05	.01	-2.40	.49	-1.32	2.26
Training	.41	.29	.24	-.86	.22	-1.51	-2.67	-.65	-1.76	-2.24	-2.12	-2.33	-2.74	-3.23	-4.73	-3.14
Equal Opportunity	.27	.39	-.14	-.02	-1.52	-.71	-.31	-1.07	-.79	-.13	.13	.07	.17	-.12	-1.89	-3.83
Command Climate	.72	-.38	-.25	1.32	1.82	.39	.99	.61	.59	.28	1.18	2.04	.79	.35	2.25	.42
Supervisory Leadership	2.49	2.16	2.69	.13	.88	.07	1.38	2.28	.21	-.40	.13	-.62	.05	3.88	6.85	8.43
Peer Leadership	-.26	-.14	.05	.37	.02	-1.60	-2.07	-1.26	-.70	-1.00	-.21	2.08	1.63	-1.03	.18	-4.82
Constant	-.60	-1.33	-3.25	-.26	-.58	-1.10	-5.13	-7.00	-5.38	-3.12	-1.86	-1.36	-3.15	-3.15	-9.08	-2.06

Table B.7

NHRMS Regression Weights and Constants for  
Equipment Readiness Equations

NHRMS Predictors	Performance Periods														
	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>	T <sub>7</sub>	T <sub>8</sub>	T <sub>9</sub>	T <sub>10</sub>	T <sub>11</sub>	T <sub>12</sub>	T <sub>13</sub>	T <sub>14</sub>
Fair & Equitable Treatment	.32	1.83	1.24	2.14	2.49	.05	-.15	.14	-.24	-.46	-1.89	.29	.98	.23	.02
Work Group Discipline	-.05	.93	1.02	.68	1.18	.95	.62	.35	.16	.19	-.62	.82	-.04	-.59	.46
Satisfaction	-1.18	-1.35	-.84	-1.58	-.88	.44	-2.22	-1.40	.45	.91	.45	-1.32	2.47	1.04	-.37
Lower Level Influence	-.06	1.66	1.47	1.07	.81	.23	-.73	.15	.51	-.64	-2.96	-.69	-2.96	-1.64	-1.52
Training	-.48	-1.32	-1.93	-2.22	-.28	-.72	.16	.31	-.21	-.51	-.41	1.44	1.01	-2.42	-2.14
Equal Opportunity	.34	.17	.43	1.11	-.56	-.39	-1.23	-1.97	-1.50	-.35	.58	.22	-.29	-.84	-.46
Command Climate	-.85	-1.39	-.98	-.68	-1.64	-.05	1.73	.66	.64	.30	1.97	-1.56	-2.30	-.91	-1.04
Supervisory Leadership	2.52	.25	-.03	-1.16	-.26	.36	.34	1.92	.13	-.75	1.36	1.83	3.95	4.38	3.97
Peer Leadership	-.58	-.50	-.44	.09	-.53	-.60	2.41	1.37	.77	.78	.33	-1.04	-2.97	.55	.09
Constant	-.76	-.39	.08	2.29	-.29	-1.06	-2.67	-4.54	-2.01	1.09	1.65	-.88	-2.07	-2.20	.24

Table R.8

NHRMS Regression Weights and Constants for  
Supplies Readiness Equations

NHRMS Predictors	Performance Periods														
	$\beta_0$	$\beta_1$	$\beta_2$	$\beta_3$	$\beta_4$	$\beta_5$	$\beta_6$	$\beta_7$	$\beta_8$	$\beta_9$	$\beta_{10}$	$\beta_{11}$	$\beta_{12}$	$\beta_{13}$	$\beta_{14}$
Fair & Equitable Treatment	-.50	.27	-.14	.81	3.09	2.28	.82	.37	.99	.51	-.11	.75	2.09	1.10	1.57
Work Group Discipline	.16	.46	.71	.44	1.92	2.10	1.28	-.50	-.10	-.09	-.68	.20	-.27	-1.57	.07
Satisfaction	-.10	-2.55	-4.08	-1.63	-.23	-.35	-.46	.60	-1.29	-.08	1.38	-1.44	3.57	2.63	1.28
Lower Level Influence	-1.52	-.50	.08	.84	-.01	-.99	-1.52	-.58	-.33	-.77	-.76	1.15	-3.18	-.33	1.03
Training	-.31	-.93	.37	-.46	.60	.98	1.09	.50	.55	-1.32	-1.62	-1.14	2.00	-2.11	-2.49
Equal Opportunity	-1.82	-.57	.90	1.10	.58	-.74	-.88	-1.38	-1.26	-.80	-1.56	-1.82	-1.18	-1.14	-3.49
Command Climate	2.18	2.21	.13	-.96	-3.19	-1.79	-.39	.82	1.31	1.30	1.10	1.62	-1.29	-.25	.78
Supervisory Leadership	-.37	-.52	1.21	-.84	-.86	-.70	-.71	-.23	-1.83	-1.22	-1.61	-1.26	-.38	-.74	1.87
Peer Leadership	2.01	3.29	1.89	.80	-1.43	-.74	.69	.87	2.08	1.54	2.92	1.80	-2.29	.92	-3.19
Constant	-1.75	-3.17	-3.48	-.04	-.96	.23	.37	-.96	.99	3.04	2.70	2.06	2.78	4.52	8.96

**Table B.9**

**NHRMS Regression Weights and Constants for Training Readiness Equations**

HMS Predictors	Performance Periods															
	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>	T <sub>7</sub>	T <sub>8</sub>	T <sub>9</sub>	T <sub>10</sub>	T <sub>11</sub>	T <sub>12</sub>	T <sub>13</sub>	T <sub>14</sub>	T <sub>15</sub>
Fair & Equitable Treatment	.01	-.67	-.79	-.28	-.28	-.56	-.43	-1.63	-.79	-.81	-1.40	-1.86	-2.09	-3.84	-3.15	3.99
Work Group Discipline	.90	2.25	1.85	2.03	1.11	.31	.29	1.32	1.43	.94	1.30	1.84	1.49	.15	-.06	.07
Satisfaction	-.27	-.85	-1.34	-2.45	-.66	1.23	1.91	1.68	.99	1.56	2.72	2.71	3.30	4.94	3.93	2.10
Lower Level Influence	.52	.96	.48	.21	.48	.44	1.49	.82	1.19	.49	.21	.41	-.33	1.11	-.47	2.71
Training	-.30	-.58	-.56	-.62	-.64	-.50	-1.91	-.97	-1.02	-1.21	-.80	-1.83	-1.52	-2.16	-3.67	-1.57
Equal Opportunity	-.18	-.02	1.00	1.03	.26	.62	-.26	-.78	-1.36	-.57	-.48	.40	.53	-.96	-.13	-3.80
Command Climate	-1.00	-.18	-.05	.52	.22	-.57	.21	.81	1.00	.78	.50	.87	.36	.74	1.30	-1.33
Supervisory Leadership	3.64	2.40	2.85	2.34	2.70	2.95	2.73	3.85	1.86	2.20	2.80	2.36	2.25	3.50	3.80	7.87
Peer Leadership	-2.53	-2.00	-2.22	-1.32	-1.87	-2.81	-2.01	-2.56	-.37	-1.02	-2.58	-2.81	-2.11	-2.60	1.49	-8.12
Constant	-3.39	-4.78	-4.79	-5.28	-4.68	-4.48	-7.04	-9.16	-9.53	-8.36	-8.51	-8.30	-8.32	-5.24	-13.51	-5.02

Table B.10

NHRMS Regression Weights and Constants for  
Personnel Readiness Equations

HOMS Predictors	Performance Periods															
	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>	T <sub>7</sub>	T <sub>8</sub>	T <sub>9</sub>	T <sub>10</sub>	T <sub>11</sub>	T <sub>12</sub>	T <sub>13</sub>	T <sub>14</sub>	T <sub>15</sub>
Fair & Equitable Treatment	-1.56	-2.71	-2.75	-1.77	-1.05	-.17	-.10	-1.04	-.61	-.08	-.05	-1.22	-.68	.04	-1.58	1.79
Work Group Discipline	2.43	1.72	2.50	2.36	1.69	1.14	.70	.63	.77	.29	-.09	-.20	-1.43	-1.60	-2.63	-2.57
Satisfaction	-.10	.72	.95	.28	.01	2.22	2.25	2.07	1.44	2.71	1.88	-.14	2.30	3.56	2.57	-.18
Lower Level Influence	.64	-.47	.07	.61	.99	1.61	1.42	.38	.18	-.16	-.62	.32	.81	1.79	1.08	2.43
Training	-.23	.06	-.28	-.82	-1.03	-2.80	-2.37	-1.42	-.68	-1.73	-1.42	-1.24	-2.13	-2.58	-3.21	-3.58
Equal Opportunity	-2.20	-1.48	-1.12	-.18	-.90	-.07	.26	.15	-.50	-.01	-1.15	-1.66	-2.32	-2.24	-3.46	-4.57
Command Climate	1.12	1.41	.95	.68	.69	-.27	-.23	.35	.03	.00	.60	1.80	.51	.32	1.91	1.96
Supervisory Leadership	3.06	3.85	3.94	1.42	.90	-.65	-.66	-.23	-.04	.04	1.18	.89	2.95	2.12	7.08	6.97
Peer Leadership	-2.04	-2.80	-4.12	-2.64	-.64	-.63	-.79	-.34	.25	-.66	.26	1.92	.91	-.04	-1.01	-.94
Constant	-4.13	-2.60	-2.07	-.65	-2.45	-1.67	-1.83	-2.50	-3.23	-2.26	-2.83	-1.74	-3.92	-2.12	-4.07	-3.38

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